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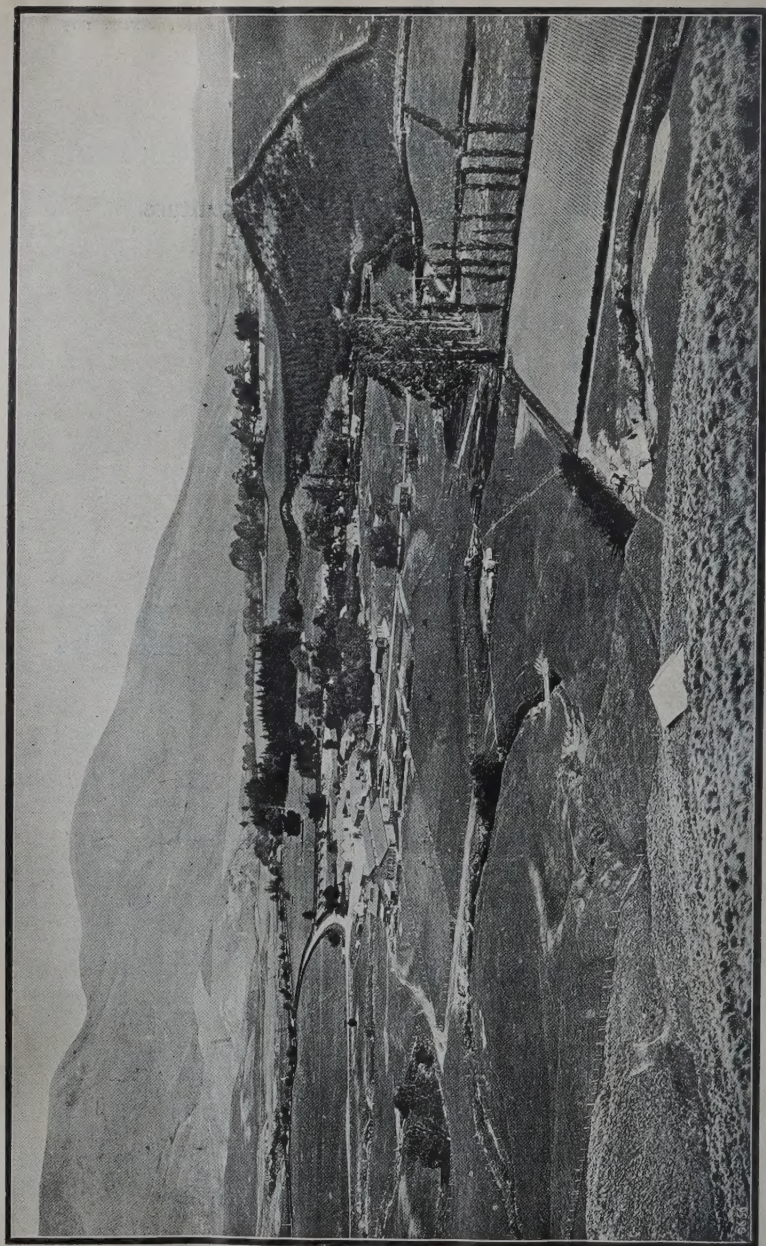
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BUSH SICKNESS.

WORK AT THE MAMAKU FARM.

C. J. REAKES, D.V.Sc., M.R.C.V.S., AND B. C. ASTON, F.I.C.

DURING the past year, though extra duties necessitated by the war have prevented much personal supervision being given to the operations carried out on the Department's bush sickness experimental farm at Mamaku, solid progress has been made. In pursuance of the policy of making the farm as self-supporting as is possible under the circumstances, cattle-grazing and dairying on commercial lines have been carried out side by side with the purely experimental and research work, these grazing operations being to some extent utilized also for the obtaining of further information regarding the possibilities of the bush-sick land when properly treated and utilized.

DAIRYING OPERATIONS.

As regards dairying, the first operations at the farm were carried out with first-calf heifers, which, grazed upon top-dressed pastures,

milked throughout their first season, and kept healthy; but later some of them developed indications of bush sickness. These have now been replaced by well-matured cows showing the Shorthorn type predominant, and selected for their appearance of good constitutional power combined with milking-capacity. These have been on the farm for over a year, and so far have given satisfactory results. Latterly, though showing no indication of bush sickness, they have been given as a precautionary measure the perchloride-of-iron lick mentioned below, and are keeping in excellent health.

In the case of both the heifers and the older cows the animals were grazed throughout upon top-dressed pastures, and the experience gained indicates clearly that milch animals, even when young and consequently most susceptible, will retain a condition of health in bush-sickness country far longer when grazing upon properly manured land than upon non-treated land. And it must be borne in mind that on the land in this district, which has received no manurial treatment, the herbage grows freely and well. It is not a question of quantity of feed but of quality.

CATTLE AND SHEEP GRAZING.

Apart from dairying, cattle and sheep grazing proved distinctly successful. Care was taken not to carry young stock or sheep over too long a period; but still, with top-dressed paddocks available, they were carried much longer than would have been the case before our investigations commenced. As an instance of this, mention may be made of thirteen two-year-old steers which were purchased on the 1st December for £4 9s. per head. Ten of these are still on the farm, have made normal growth, are in excellent health, and are worth £9 10s. each. The other three were sold on the 1st July, in good health, for £7 each. Another instance is afforded by a mixed line of twelve two- and three-year old steers bought on the 12th December for £6 15s. each. Of these, six were sold on the 29th June for £10 each; on the 1st July five were sold for £9 3s. each. The remaining one is still on the farm, in good health, and worth at least £10 10s. Again, a lot of fifteen two-year-old steers were bought on the 13th October of last year for £4 14s. per head. Eleven of these were sold on the 1st July for £7 each, and four for £9 3s. each.

Store sheep also paid well. A mob of 120 wethers bought at 15s. 6d. were sold at an average of £1 2s. 3d., while ten dry ewes bought at 11s. were sold for £1 1s. 6d.

The land used for grazing store stock consisted of an area which had received no top-dressing whatever, on which cattle were grazed

for a part of their time, being changed as seemed desirable on to one or the other of two paddocks top-dressed respectively with superphosphate and slag ($2\frac{1}{2}$ cwt. each per acre) and ground rock phosphate (4 cwt. per acre). The sheep were kept almost entirely to the top-dressed land.

One further sale must be recorded—that of a steer purchased for the first experimental work undertaken in 1911. This animal emerged from his first experiment in a well-established condition of bush sickness, made a recovery on a paddock top-dressed with superphosphate, again became badly sick, was completely brought



FOUR TWO-YEAR-OLD BEASTS RAISED ON THE MAMAKU FARM WHICH ARE SURVIVING, LARGELY OWING TO THE USE OF THE IRON LICK.

In the distance are some of the volcanic "necks" or cones characteristic of this district, which are easily carved into drinking-troughs and reservoirs, from which water is distributed all over the farm.

round by treatment with syrup of phosphate of iron, and then kept on top-dressed pasture without medicine. Though healthy he was not by any means prime. He sold as a five-year-old for £11 19s.

DIFFICULTY IN REARING YOUNG STOCK.

In rearing young animals to maturity considerable difficulty has been experienced. Lambs have proved a total failure, they having succumbed to bush sickness always well within twelve months. Calves have done better only by comparison, as out of sixteen

calves born in 1913 only four have survived, while of those born in 1914 only two are left. These survivors are in good health and condition, though some have had to be given medicinal treatment in the form of a lick, which has proved effective. In respect to some of these, bush sickness cannot be entirely blamed for their death. The climate in this district renders their first winter hard upon calves, and before any indication of bush sickness was observable several suffered severely from digestive disturbance accompanied by diarrhoea. This so weakened them that they later became an easy prey to bush sickness and succumbed. These calves were purposely reared under ordinary dairy-farm conditions. This season a further attempt to rear all the calves born is being made, the feeding methods being changed.

MEDICINAL TREATMENT.

The efficiency of syrup of phosphate of iron both in curative and preventive treatment has already been well proved (see *Journal* for February, 1914, p. 159), but its one drawback, from the practical standpoint of the farmer, is that it has to be administered by hand daily over a period of some three or four weeks at a time.

Experiments with cattle-licks which, like rock salt, might be allowed to lie in a covered trough and taken at will by the stock were begun as early as December, 1912. The original lick, which was made into brick form, contained ferrous sulphate, salt, and lime. After several trials with other mixtures one was finally adopted containing perchloride of iron and salt cemented together with plaster-of-paris and a little lime. This, as already noticed in the *Journal* (September, 1915, p. 228), has given most encouraging results. The four calves born in 1913, shown in the accompanying photograph, taken 8th October, 1915, and mentioned above, all exhibited last year the earlier characteristic indications of bush sickness, although grazed on top-dressed pastures, but regained normal health after being supplied with this lick, no other medicinal treatment being given.

The stock in time become very fond of the lick, although it may require to be mixed with a little salt at first to coax them to take it. The illustration shows the method of placing the lick under cover near the drinking-water. The bricks should on no account be left exposed to rain, which would dissolve out the constituents.*

* This medicinal lick may now be obtained by farmers in the affected area from the Manager of the Experimental Farm, Mamaku (Mr. R. A. Jackson), at the actual cost price, 9d. per brick.

While sufficient evidence is already available to prove that this lick is of great value in maintaining health, it must not yet be assumed that it is in itself sufficient to enable cattle and sheep to be kept healthy. It is still evident that proper manurial treatment of the soil is a most valuable factor in combating bush sickness. But the lick promises to prove at least a valuable aid to successful farming operations.

MANURIAL DRESSINGS.

As was to be expected, phosphates have given the best results in improving the feeding-value of the pasture. Of these a mix-

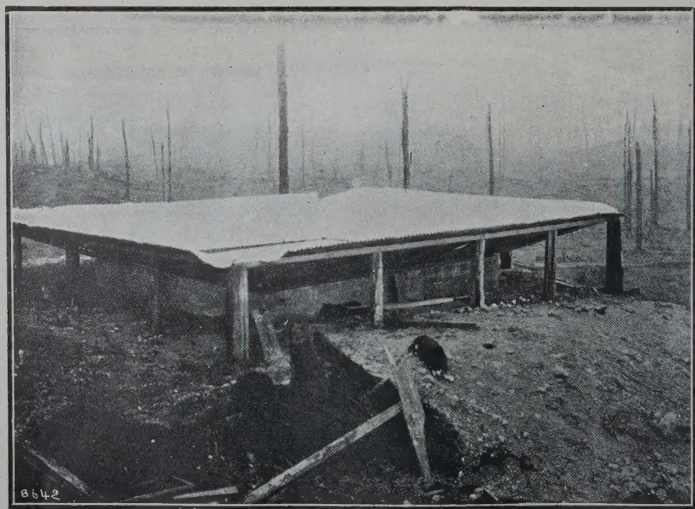


DRINKING-TROUGH EXCAVATED OUT OF VOLCANIC ROCK (A RHYOLITE BRECCIA CONE). PREVENTIVE LICK UNDER COVER ON RIGHT.

ture of basic slag and superphosphate undoubtedly has increased the growth of clovers to a greater extent than the other phosphates, and this mixture is therefore to be accorded the first place. Basic slag, however, is almost impossible to obtain at present, owing to the war. A trial is being made with a new brand of basic phosphate recently introduced to the New Zealand market. A good trial is also being given to ground rock phosphate, but it is early yet to form an opinion as to its relative value.

WATER-SUPPLY.

A system to provide an increased water-supply has been provided. When the farm was taken over by the Department an artesian well existed, but this gave considerable trouble, and it became necessary to provide an alternative supply. This was done by excavating a large rain-water tank in an elevated mass of volcanic rock. This rock is of a soft consistency, and easily cut by means of a pick. After the tank had been completely excavated the bottom and sides were faced with a cement wash, which gave a firm watertight surface. The dimensions are—depth, 12 ft.; length, 16 ft.; breadth, 14 ft. The holding-capacity



RESERVOIR EXCAVATED OUT OF ELEVATED VOLCANIC ROCK, AND FITTED WITH IRON COLLECTING-ROOF.

is over 16,000 gallons. Sheets of galvanized iron were fitted over in such a way as to discharge into it all rain-water caught, as shown in the photograph. Only thirty-five bags of cement were used in constructing this reservoir, which is now full of water. Another is being made at the back portion of the farm. All labour in connection with this tank was performed by the Farm Manager and his assistant.

OTHER WORK.

Further experimental work is being carried out in several directions, but in the absence, as yet, of definite results it is

not proposed to go into detail regarding this at present. Save where failure occurs within a comparatively short period, as was the case when we tried to rear lambs on the farm, several months must elapse before the result of an experiment can be attained. One interesting experiment may be specially mentioned. The subject of this is a yearling steer, bred outside the bush-sick area, which was placed in a small unmanured paddock in April last, the only drinking-water available being supplied by a drinking-trough. This water is chemically treated. So far the animal has kept in good health and has made normal growth, but it is far too early yet to form any conclusions.

A few acres have been completely cleared, ploughed, and cultivated, good root crops having been grown and utilized for winter feed for the milking cows and calves. A quantity of hay also was saved, and similarly used.

CONCLUSIONS.

Even with our present knowledge there can be no doubt that this bush-sick land, suitably top-dressed and manured on right lines, can be profitably farmed by those possessing sufficient capital. Money is necessary for manures, and good management is essential, but every pound sterling judiciously spent on the right manure immensely increases the grazing-value of previously unmanured land, this increase being principally in the feeding-value of the herbage and of the crops secured from cultivated land. "Bush sickness" is no longer a mystery—it now simply offers a field for the application of scientific knowledge in counteracting the lack of necessary chemical constituents in the food-plants produced within the affected area. The lines on which further work must be carried out are clearly indicated by the two clear-cut experiments which have given definite and successful results, viz. :—

- (1.) The maintenance in good health and condition of young cattle grazed upon pasture heavily top-dressed with superphosphate, the soil containing iron principally in a form unavailable under natural conditions (see the *Journal* for April, 1913).
- (2.) The efficacy of iron salts in curative treatment of advanced cases of bush sickness, as shown by (a) the efficacy of syrup of phosphate of iron, (b) the promising results so far obtained by the use of the perchloride-of-iron lick.

One practical commentary upon the work done up to the present lies in the fact that land-values in the neighbourhood of the Mamaku Farm are said to have risen about 50 per cent. of late.

POLLEN-GRAINS AS SOURCE-INDICATORS OF HONEY.

CONTINUED.

R. WATERS.

THE first of this series of articles, which appeared in the September *Journal*, set out the order in which the pollen-grains were proposed to be examined. Owing to the limited variety of flowers at this season, this order has not been strictly observed. An examination, however, of available material shows that in certain cases the pollens of different species, and even of different families, of plants closely resemble one another in size, shape, and surface. This emphasizes the fact that the limits to the value of pollens as honey-source indicators may be determined chiefly by the study of such similar pollen forms.

MEASUREMENT OF POLLEN-GRAINS.

Before proceeding, a note under this head is necessary. The natural size of the grains is expressed in microns, the symbol for which is the Greek letter μ . One micron equals the thousandth part of a millimeter, or thirty-nine millionths of an inch. Two or three measurements are usually given of axes (or diameters) of each pollen-grain. The axes, unless especially stated otherwise,

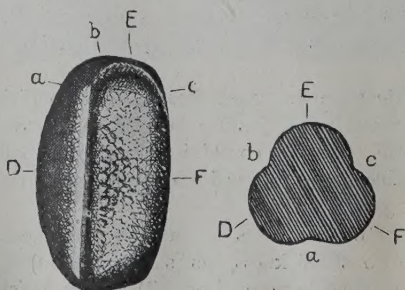


Fig. 1.

Fig. 2.

PLATE I.—WHITE CLOVER (*TRIFOLIUM REPENS*).

Fig. 1, side view. Fig. 2, transverse section through the middle of the longitudinal axis. Natural size: Length, 39.8μ ; breadth, 22.8μ . Magnification, 920 diameters.

[Original.

are of the grains in the position they are most frequently observed when resting on a plane surface. Each figure given is the average of ten measurements of the same axis in different grains. The drawings have been made to scale, and as reproduced herewith show the grains about nine hundred times larger than their actual size.

ELLIPSOID POLLENS.

This is the most important class of pollens yet observed, for in the first place it includes those of white clover (*Trifolium repens*) and other prominent honey plants, and in the second it is the pollen-form common to many plants botanically distantly related. In the Leguminosæ (pea and clover family), the Caprifoliaceæ (honeysuckle family), the Pittosporaceæ (tarata family), the Rosaceæ (rose family), and others, ellipsoid pollens have been observed. In fact, amongst those pollens so far examined the most common shape met with is ellipsoidal.

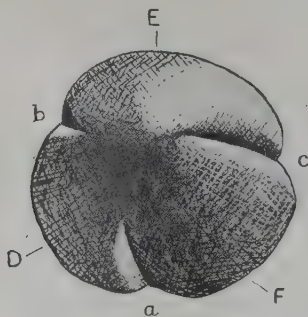


PLATE II.—END VIEW OF AN ELLIPSOID POLLEN-GRAIN.

[Original.]

The pollens included in this class are those which in shape somewhat resemble that of an egg, except that one end is not thicker and blunter than the other as with an ovoid. (Plates I, Fig. 1, and II.) Moreover, in the ellipsoid pollens three grooves at even distances apart run from end to end along the surface of the grain. (Plates I and II, *a*, *b*, and *c*.) These grooves, usually deeper towards their middle points, vanishing towards the ends, divide the surface of the grain into three similar faces. (Plates I and II, *d*, *e*, and *f*.) If the pollen-grain is cut through at right angles to its longitudinal axis—*i.e.*, transversely—the cut surface presents the shape of a clover-leaf, by reason of the three grooves in section *a*, *b*, and *c* set at even distances apart round the outline of the cut surface. (Plate I, Fig. 2.) Under the

microscope this view is obtained when the grain is viewed squarely from the end and in a plane corresponding to such transverse section. Plate I, Fig. 1, does not show an elliptical outline to the grain as might be expected. Instead of this it will be seen that both ends on the right side appear somewhat square rather than rounded so as to correspond with the left, and that the right side of the outline of the grain is less rounded than the left. This view is presented when the grain is so resting that the uppermost groove (*a* in this case) is not centrally situated in relation to the outline of the grain as in the figure. In such a position groove *c* throws out the symmetry of the outline at the ends and on the right side. If, however, the uppermost groove *a* is centrally situated in relation to the outline, the grooves *b* and *c* are then both out of sight beneath, and the outline is quite elliptical as in the case of a perfect ellipsoid.

Type I (White Clover Type).

White clover (Plate I) is a type of pollen with which the following species, owing to its particularly close resemblance, will be compared—

Tagasaste (*Cytisus proliferus*). Others may be added to this later.



Fig. 1.



Fig. 2.

PLATE III.—TAGASASTE (*CYTISUS PROLIFERUS*).

Fig. 1, side view. Fig. 2, transverse section through the middle of the longitudinal axis. Natural size: Length, 35.6 μ ; breadth, 20.9 μ . Magnification, 920 diameters. [Original.]

In general, tagasaste (Plate III) is slightly shorter and narrower than white clover. Its grooves are narrower, being very narrow; therefore in transverse section the clefts in the outline are less open than in those of white clover (Fig. 2). When the uppermost groove is not centrally situated in the outline of the grain the ends of the tagasaste are not so square, and there is not the same marked difference between the curvature of the right and of the left side-outlines as in the case of white clover. In transmitted

light, fresh specimens of tagasaste are old-gold in colour, while white clover is water-white. Though the colour of the former is the most distinctive feature in fresh grains, it is not yet known whether this character is sufficiently permanent to be in itself a reliable means of identification.



Fig. 1.



Fig. 2.

PLATE IV.—GORSE (*ULEX EUROPAEUS*).

Fig. 1, side view. Fig. 2, transverse section through the middle of the longitudinal axis. Natural size: Length, 45.7μ ; breadth, 22.2μ . Magnification, 920 diameters. [Original.]

Type II (Gorse Type).

The greater length of gorse, its more pointed ends and more curved side-outlines mark it off as a type distinct from type I (white clover). Similar to it is—

Broom (*Sarothamnus scoparius*).



Fig. 1.



Fig. 2.

PLATE V.—BROOM (*SAROTHAMNUS SCOPARIUS*).

Fig. 1, side view. Fig. 2, transverse section through the middle of longitudinal axis. Natural size: Length, 43.3μ ; breadth, 20.7μ . Magnification, 920 diameters. [Original.]

The surface granulations of broom, under a magnification of 465 diameters, appear as a minute reticulation, unlike gorse, which is less clearly granulated, the reticulations only slightly appearing

as such. In transmitted light, broom is a deep golden-yellow, while gorse is a very pale watery-yellow. As before mentioned, the value of colour as a distinctive character is not ascertained. The shade of gorse is similar to that of tagasaste.

Type III (Wild Turnip Type).

Wild turnip (Plate VI) is distinctly marked off from types I and II by reason of its opacity in transmitted light and its distinctly pronounced surface reticulation (Fig. 1)—more pronounced than in broom. It is noticeably smaller than in type I, and much smaller than type II. When the uppermost groove is not centrally



Fig. 1.



Fig. 2.

PLATE VI.—WILD TURNIP (*BRASSICA RAPA*).

Fig. 1, side view. Fig. 2, transverse section through the middle of longitudinal axis. Natural size: Length, $34.1\ \mu$; breadth, $18.5\ \mu$. Magnification, 920 diameters. [Original.]

situated in the outline of the grain, it displays ends almost imperceptibly square—in this differing from type II and contrasting strongly with type I. The grooves are much shallower; thus in transverse section the outline is more nearly round than in types I (Fig. 2) and II. The colour is distinctive, being pale green in transmitted light.

So far no other pollens similar to this type have been met with.

(TO BE CONTINUED.)

Last month a party of about a hundred boys from the Wanganui Collegiate School who are taking the agricultural course spent a day at Moumahaki Experimental Farm. The party was divided into four the divisions, each group in turn being taken round for instruction by different officers of the farm staff as follows: General agriculture and pastures (the Manager); cattle (the Manager's Assistant); plant-breeding (the Plant-breeder); horticulture (the Orchard and Garden Overseer). The Principal of the School has expressed his appreciation of the instruction given to the students.

GREEN-MANURING IN THE ORCHARD.

T. E. RODDA.

It is a recognized fact that clean cultivation is essential for thorough success in fruitgrowing. If, however, the practice is followed indefinitely on the poor clay lands of the Dominion which are now being planted so extensively in fruit, it will have the tendency to deplete the soil almost entirely of its supply of humus. There is a wide difference of opinion regarding the advantages to be gained by green-manuring in fruit areas, but there is no getting away from the fact that if we desire to grow good fruit as well as other farm crops we must endeavour to maintain a sufficient supply of vegetable matter or humus in the soil, in order that its active decay may ensure an ample supply of available plant-food.

SOME PRINCIPLES OF GREEN-MANURING.

Humus performs many important beneficial functions in the soil. It affects the physical properties of the soil, increasing the ease of tilth, moisture-holding capacity, capacity to absorb heat, &c., and decreasing the tendency to puddle when wet and to bake when dry. Any farm crop which is grown for the sole purpose of ploughing under to increase the supply of organic matter in the soil is known as green manure. Some of the possible benefits to be derived from green-manuring are—(1) Addition of vegetable matter or humus; (2) increase of the nitrogen-content of the soil by fixation of nitrogen of the air when leguminous crops are used; (3) using of surplus available plant-food which might otherwise be lost; (4) bringing nearer the surface plant-food from lower depths and making it available for subsequent crops; (5) reduction of the danger of the loose soil on hillsides being washed to lower levels by heavy winter rains.

The kind of crop which may best be used as a green manure depends upon which one or more of these beneficial effects is most desired. If the addition of humus is the only necessity, or if the soil is of a very tenacious nature, then any rank-growing farm crop may be used. The more succulent or juicy plants are best, as they decay much more quickly and are more

easily incorporated in the soil. Such crops as oats, barley, or rye-grass are to be recommended. Rye-grass is exceedingly good, especially the Italian variety (*Lolium italicum*), which grows very quickly and has the power of resisting a fair amount of drought.

If, however, the supply of nitrogen in the soil is small, and its increase in addition to humus-content is desired, then some leguminous crops may be used, such as clovers, vetches, peas, lupins, beans, &c. Here it may be noted that legumes or leguminous crops are a group of plants characterized by growing their seeds in pods and by having peculiar knots or nodules on their roots. These nodules are formed by the action of a certain group of bacteria, immense numbers of which are found in each nodule. They possess the peculiar property of being able to use the gaseous nitrogen of the air for their own growth, and of supplying this element as they die or decay to the host plant on whose roots they are located. No other group of plants or animals, so far as is known, is thus able to make use of atmospheric nitrogen. Legumes may grow in soils which are rich in available nitrogen without the presence of nodule-producing bacteria, deriving their nitrogen-supply directly from the soil as do other crops, but they have the distinctive power of being able to flourish in soils poor in nitrogen if the proper bacteria are present to grow upon their roots and supply them with nitrogen from the air, and when so grown to increase the supply of soil nitrogen when ploughed under as green manure.

The amount of actual gain in nitrogen to the soil from the growing of leguminous cover-crops depends upon several factors, such as (1) the kind of crop used; (2) the amount of nitrogen already present in the soil, as this affects the proportion of nitrogen which the crop will take from the air; and (3) the proportion of the crop which is returned to the soil. The nitrogen-collecting nodules on various legumes are slightly different or at least operate in a slightly different way. Take, for instance, the lupin and the pea. According to leading authorities on the subject, the bacteria in this case are totally different. The lupin will grow and flourish where the pea will not exist. Lupin has been used extensively in some of the older countries of the world for breaking-in areas of reclaimed sea-marshes and mud-flats. Probably the first crops produced were almost infinitesimal, but the bacteria set into active operation by the lupin rapidly increased, so that after a while the land was capable of growing clover, peas, &c., and so on until by gradual evolution it was capable of growing most crops. The discovery of the differences in bacteria is of great importance, and throws a large amount of

new light on the "rotation of crops" rule practised by leading agriculturists throughout the world.

It is a debatable question amongst experts whether there is a positive increase in soil-nitrogen under any other method than by means of legumes or the residue therefrom. Taking the average soil, the amount is only maintained by liberal manuring. Farmyard manure, if applied in large quantities, gives better results than artificial manures; but, according to experiments carried out at Rothamsted, even with this liberal treatment the manure does not seem to increase the soil-nitrogen. When artificial manures alone are used there does not seem to be any appreciable gain to the soil-nitrogen. Therefore it can only be said of artificial manures that by increasing the crop-residue they indirectly increase soil-nitrogen.

Potash is most essential for the production of good and well-coloured fruit. This ingredient is often present in many soils in large quantities, but is in such a form that it cannot be made use of by fruit-trees. On such soils I would recommend the planting of crops like rape or white mustard, as they readily assimilate the potash, and when grown as green manure and again incorporated with the soil they leave the potash in such a form that it can be readily utilized by the trees.

PRACTICAL POINTS FOR ORCHARDISTS.

Coming now to the practice of green-manuring, the time for seeding the various crops may be first considered, and this opens up a big field for argument. Taking the Dominion on the average, early autumn is looked upon as nature's seeding-time for nearly all grasses and the clovers, but there are certain districts which must be regarded as exceptions to the rule. From my experience I would advise growers to sow cover-crops as follows: Clovers in early spring or early autumn according to soil and locality; peas and vetches in early autumn; mustard and rape in December and January; oats and barley in February or March.

The following quantities of seed will be found to be a fair and liberal seeding per acre: Rape, 7 lb.; mustard, 9 lb. to 12 lb.; oats, 2 bushels; peas (Canada pea or field-pea), 100 lb.; clover, 12 lb. All the above-mentioned seeds can be sown with the ordinary farm drill or be broadcasted by hand, the former being much the quicker and handier method, especially if a little artificial fertilizer is sown with the seed.

The strip of land from tree to tree in the rows that cannot be sown by drill is best left vacant, because, if used, it will be found impossible to plough under that portion of the crop satisfactorily.

When the crops are ready for turning under the work can be expeditiously carried out by a plough with a long sweeping mouldboard and weighted chain. Many prefer to put the roller over the crop before ploughing under, but to my mind this is not necessary. Should the roller be used, care should be taken to roll the crop in the direction in which the plough will run. On no account should the roller run one way and the plough the reverse. The best procedure is to start alongside one line of trees and finish the land alongside the next row. By proceeding thus the soil will be banked up at every alternate row, and the intervening rows will show the double furrow finish.

After ploughing the crop under, the land should be worked down with a disk harrow. On no account should cultivating be attempted with a scarifier, as that implement will simply pull the crop to the surface again and defeat the object sought. An orchard disk with the gangs working all the one way is an ideal implement to use after cover-cropping. By having the gangs with an offset—that is, turning to the right—the open-furrow finish will be filled in, a state of cultivation that is very desirable during summer, especially if the land is of a heavy clay nature.

The strip of land that was left unsown can now be cultivated by running the disks across the orchard diagonally. Running at right angles is well enough on land of a loose nature, but it will be found on dealing with hard land that the shock on crossing the double furrow finish is very trying on the shoulders of the team, to say nothing of the strain on the implement. By crossing on the diagonal the shock is much reduced, and when recrossed on the opposite diagonal the unploughed portion will be found cut in dice shapes, which will break down readily under the ordinary harrows.

When the orchard is again laid down in cover-crop the seed should be drilled in the opposite way, such procedure ensuring the whole of the land being cover-cropped periodically.

Mr. R. H. Hooper, who has edited the *Journal* during the last few months, has been appointed Editor to the Department as from the 1st July, 1915.

LIMESTONE DEVELOPMENT IN CANTERBURY.

FOREWORD.

B. C. ASTON, F.I.C.

SOME months ago Mr. E. Parry, Electrical Engineer to the Public Works Department, consulted me respecting the economic development of the water-power in Canterbury with regard to its use in agriculture, and I suggested that any spare power might be utilized in grinding limestone and phosphate to a powder for use as a dressing for soils. The only Government water-power station is situated in Canterbury, and it was necessary to know the best site for the erection of a grinding plant, which again it was necessary to place in a district where the demand for lime was large, and which at the same time could be served with the Lake Coleridge power.

The initial object of the inquiries was, of course, the selection of a preliminary site, in order that the Public Works Department could frame estimates of the cost of production. The information required concerning limestone fell under the following headings:—

- (1.) What amount of ground limestone could be profitably used annually by farmers within the area possible to supply with power from Lake Coleridge Station?
- (2.) Where would be the most favourable site for the erection of a grinding plant?

Arising out of (1) are required an estimate of the areas of the different classes of soil in the Canterbury District; a knowledge of the farming-practice of these areas with regard to the present use of (a) ground limestone, and (b) caustic lime; and how far the use of carbonate of lime would be stimulated by a great reduction in price. Arising out of (2) are a knowledge of the limestone deposits of Canterbury capable of being worked from a railway, their nature and location.

Although there was no intention to conduct anything like a complete soil-survey, it was arranged that something in the nature of a reconnaissance of the types of lands, farming-practice with regard to lime, and potentiality of the limestone deposits of Canterbury should be made. The instructions covering the action

to be taken on these lines, drawn up by the writer at the request of the head of the Fields Division last May, concluded with the words "A special lookout should be kept for soft limestone such as calcareous oozes, marls, or sinters, as the discovery of a large deposit of this would obviate erecting any grinding plant whatever."

Mr. McTaggart has been assiduous in his search for information in Canterbury, and the success which has attended his efforts is best told in his own words.

SURVEY OPERATIONS AND LIMESTONE FINDS.

A. McTAGGART, M.S.A.

WITH a view to dealing with various aspects of the lime question as affecting Canterbury, a flying survey of soils and limestones in that province was recently made by the writer. The various general types of soil in the several districts were plotted on large maps. Samples of limestone were collected from every important known deposit in Canterbury and forwarded to the Department's Chemist (Mr. B. C. Aston) for analysis; and a report was submitted treating of the past use of lime in Canterbury, the soils most requiring it, and the possible use by farmers of this great soil-improver.

A special lookout was kept during the course of the survey for deposits of soft carbonate of lime, the discovery of which would obviate the necessity of grinding the rock. In South Canterbury two areas of lime in this form were located, the one proving to be an extensive area of second-grade cliff débris (talus) in the Limestone Valley, near Cave, and the other an area of first-grade soft carbonate of lime at Upper Waitohi that had been previously discovered. Unfortunately, both these deposits were not very handily situated with respect to the railway.

THE NORTH CANTERBURY FIND.

When the survey was almost completed, as a fitting culmination to the work, extensive deposits of soft carbonate of lime were discovered at Waikari, in North Canterbury. These deposits are situated, with respect to the railway, from a few chains to three-quarters of a mile, lying beneath the surface of the soil at distances ranging from 1 ft. to 3½ ft. They vary from second-grade to first-grade lime, with a maximum of 93.9

per cent. carbonate of lime, and are sufficiently finely divided to permit of the material being distributed with an up-to-date distributor, several of which are on the market.

The circumstances of the discovery may be briefly narrated. When visiting the Waikari district during the course of the survey the writer visited Mr. H. H. Holland, who, among others, had taken a keen interest in the development for agricultural purposes of the Weka Pass rock-lime area. Mention was made by me to this gentleman of the value for agricultural purposes of a limestone gravel that contained a considerable amount of soft lime and was being quarried for road purposes at Waikari. This reference caused Mr. Holland to remember that there existed



HILLSIDE ON MR. H. H. HOLLAND'S FARM, WAIKARI, UNDERLAID BY SOFT LIMESTONE.

beneath a portion of his land a soft limey substance, the material being excavated when post-holes were dug. The writer forthwith expressed the opinion that it was probably what he had been keeping a special lookout for—naturally ground carbonate of lime.

Excavation of some of the material appearing at a depth of 2 ft. from the ground surface bore out this opinion. A sample was ultimately forwarded to the Chemist for analysis, and this proved to yield about 88 per cent. lime-carbonate on the moisture-free basis. Later on borings were undertaken by Mr. Holland, and the depth of the deposit was to some extent defined, the boring-rod being still in the material at a depth of 14 ft.

As the result of this find equally large deposits of the same material were located on an education reserve and on at

least four other privately owned areas of land in the district. A deposit of it was also located on the Cheviot Estate (Crown land) at a point some four miles from Domett Railway-station. A 14 ft. boring on the education reserve mentioned also left the rod in the deposit at that depth.

All the deposits are readily accessible, and it is not anticipated that their development will entail much labour and expense. This assumption, together with the probability of there being millions of tons or unlimited supplies of this desirable material in the locality, should ensure the supply to Canterbury farmers,



THE BORING-ROD DOWN 14 FT. ON MR. HOLLAND'S LAND, STILL PENETRATING THE SOFT LIMESTONE.

and perhaps farmers in certain other districts, of a cheap acceptable lime for agricultural purposes. The proper handling of the output by farmers themselves, co-operatively, should guarantee this, nature in her bounty doing the rest.

DEVELOPMENT PROJECTS AND MECHANICAL IMPROVEMENTS.

Projects for working these soft-lime deposits are at present in the evolutionary stage. The Waipara County Council has begun by working a roadside deposit quite close to the Waikari Railway-station. Some 33 tons was sent to various points in Canterbury for experimental purposes by the Department, while

since then at least 60 tons has been dug out and bagged up for despatch to various parts of the province and to two points in the Clutha district of Otago. The Farmers' Union of Canterbury is taking a keen interest in the deposits, and it is likely that before long a company of farmers will be formed for purposes of working the lime and supplying it at a reasonable rate. The Waipara County Council finds that it can, under present hand-labour conditions, supply the lime at not more than 8s. per ton. The usual concession of free railage for 100 miles has been granted by the Railway Department.



LOOKING DOWN FROM THE SOFT LIMESTONE HILLSIDE ON MR. HOLLAND'S PROPERTY.

The railway is shown three-quarters of a mile distant.

It is hoped that later on the lime from the deposits will be excavated by machinery, improved in fineness by sieving combined with slight pressure, dried somewhat by exposure to the air, and placed loose into the truck for transmission to a railway-siding used by the farmer. Machinery for distributing the lime on the land is already on the market in different forms. Recent trials with certain existing farm machinery have shown fairly satisfactory results, the lime being readily applied to the land irrespective of the semi-hard lumps it to some extent contains. Certain implement firms are also giving some attention to the

matter of designing or improving on machinery that will effectively distribute unscreened or rough lime from naturally occurring deposits or from lime-works. Thus there should be no diffidence on the part of farmers with respect to the effective application of this naturally cheap form of agricultural lime. Moreover, still further developments are looked for in this direction in the near future.

ANALYSES OF SOFT LIMESTONES.

Referring to the list of analyses of Canterbury limestones published in the October issue of the *Journal*, it may be noted that among the samples from the Waipara and Cheviot Counties



DEPOSIT OF SOFT LIMESTONE ON EDUCATION RESERVE NEAR WAIKARI.

The rod had been down 14 ft. without finding the bottom of the deposit.

particularly were several soft limestones. Samples G 218 to 222 were taken during the present year. These, with the exception of sample 220, are soft limestones, as are also samples G 210 and 226 from the Waipara County, G 170 from Geraldine County, and G 165 from Limestone Valley, Levels County. Some of these soft limestones contained a fairly high percentage of moisture, and when figured on the moisture-free basis their percentages of calcium carbonate would show up considerably higher than as published. Sample G 214, shown as possessing

71.31 per cent. calcium carbonate, contained 18.47 per cent. of moisture, and when figured on its moisture-free basis would possess as much as 87.46 per cent. Sample G 226, showing a percentage of calcium carbonate of 60.82, had 19.6 per cent. of moisture, and would similarly figure out at 75.67 per cent. Sample G 170 contained 14.64 per cent. of moisture. Thus some



SOFT-LIMESTONE DEPOSIT AT ROADSIDE NEAR WAIKARI.

of these soft limestones are better than they really look in print. By the various handlings of the material a good deal of moisture will be driven off, and their proportion of lime-content correspondingly enhanced. Samples G 398 and 400 were taken with an auger from depths ranging from 8 ft. to 14 ft. from the ground-surface; while sample G 399 was taken at a depth of

6 ft., at which depths there would be an increased moisture-content as well as limited means of obtaining representative samples.

CONCLUSION.

On the whole the analyses of the various deposits, together with the extensive nature of these soft-limestone areas in the Waipara County, reveal a highly satisfactory position from the standpoint of cheap lime for the farmers of Canterbury. It may be added that departmental experiments with various forms and quantities of lime are now under way at twenty-two different points in the province.

PUREBRED SHEEP IN NEW ZEALAND.

POSITION OF THE VARIOUS BREEDS.

JOHN LINTON.

As in previous years, the accompanying tables showing the progress of the various sheep breeds registered in the flock-books have been compiled by copying the breeders' returns in the latest volumes—namely, the Romney Marsh Flock-book, Vol. xi, 1915; the North Island Flock-book, Vol. xiv (New Series), 1915; the New Zealand Lincoln Flock-book, Vol. iv, 1915; and the South Island Flock-book, Vol. xi, 1915.

It will be understood that the returns of lambs are for those born in 1914; and these are therefore entered in the tables as two-tooths. In the official sheep returns both sexes of lambs are bulked, so that the number of ram lambs on the 30th April, 1915, is arrived at by halving the number of lambs.

In order to estimate the number of rams likely to be available for service during the coming season the figures in the tables require to be discounted by a percentage for deaths, old age, and culls—say, 33 per cent. for all rams over two-tooth, and 15 or 20 per cent. for two-tooths.

There is nothing very startling in the figures this year. Breeders continue to be conservative in their output of young rams, but the

time is now in sight when registered flocks will supply sufficient rams for the needs of the Dominion, this applying to the South Island especially.

It may be mentioned that there are twenty South Island flocks—numbering 4,895 ewes and 2,147 two-tooth rams—registered in both the Romney Marsh and South Island Flock-books. There are also two South Island flocks, numbering 873 ewes and 450 rams, entered in both the Lincoln and South Island Flock-books. These sheep have been correctly located for the purpose of the tables.

It is still to be regretted that many owners who have introduced breeds new to New Zealand either fail to register or neglect to send in returns of the progress of their studs.

PROGRESS OF THE SHEEP BREEDS.

A Synopsis of the Flock-books.

Breed.	Number of Flocks.	Breeding- ewes.	Increase.	Decrease.	Two-tooth Rams.	Increase.	Decrease.
NORTH ISLAND.							
Romney	253	37,785	900	..	15,667	313	..
Lincoln	125	19,099	1,497	..	6,772	34	..
English Leicester ..	19	1,415	..	363	520	63	..
Border Leicester ..	9	877	36	..	258	..	166
Southdown	88	9,338	1,903	..	3,799	699	..
Shropshire	8	399	..	71	184	..	6
Ryeland	3	42	..	25	24	3	..
South Devon	1	54	..	3	17	..	4
Totals, 1915 ..	506	69,009	4,336	462	27,241	1,112	176
„ 1914 ..	494	65,135	..	..	26,305	..	..
SOUTH ISLAND.							
Border Leicester ..	171	19,410	..	1,132	9,483	436	..
English Leicester ..	113	17,502	..	1,721	7,529	18	..
Romney	132	20,619	840	..	8,454	397	..
Southdown	61	6,005	668	..	2,383	537	..
Lincoln	15	2,025	105	..	862	..	48
Shropshire	33	3,372	..	263	1,412	109	..
Merino	22	8,497	672	..	2,646	169	..
Corriedale	22	10,277	..	913	4,152	498	..
Ryeland	4	443	284	..	153	100	..
Suffolk	1	14	14	..	4	4	..
Totals, 1915 ..	574	88,164	2,583	4,029	37,078	2,268	48
„ 1914 ..	584	89,610	..	..	34,858	..	..
Half-bred, 1915 ..	5	8,856	5,457	..	984	..	452
„ 1914 ..	1	3,399	..	..	No ret.	..	..

Table showing the Numbers of the Various Breeds registered in the Flock-books compared with the Official Returns of Stud Sheep, as at the 30th April, 1915; also, the Approximate Number of Rams available for Service during the coming Season.

Breed.	Breeding-ewes.		Two-tooth Rams.		Sheep Returns.	
	Sheep Returns.	Flock-books.	Sheep Returns.	Flock-books.	Stud Rams.	Flock Rams.
NORTH ISLAND.						
Merino	1,523	..	789	..	152	4,228
Lincoln	28,300	19,099	10,719	6,772	1,492	32,785
Romney	72,950	37,785	27,323	15,667	5,385	101,910
Border Leicester ..	2,655	877	899	258	149	2,744
English Leicester ..	1,757	1,415	608	520	165	3,029
Shropshire	1,361	399	432	184	82	1,473
Southdown	13,405	9,338	4,786	3,799	1,018	15,039
Other breeds	1,877	96	466	41	186	2,292
Totals, 1915	123,828	69,009	46,022	27,241	8,629	163,500
„ 1914	111,351	65,135	43,891	26,305	7,080	168,688
SOUTH ISLAND.						
Border Leicester ..	23,384	19,410	9,870	9,483	1,534	28,368
English Leicester ..	17,708	17,502	6,010	7,529	1,051	27,783
Romney	28,625	20,619	11,405	8,454	2,125	34,646
Southdown	6,608	6,005	2,433	2,383	248	2,261
Lincoln	4,557	2,025	929	862	232	2,848
Shropshire	4,240	3,372	1,408	1,412	426	4,476
Merino	16,712	8,497	4,370	2,646	1,135	14,061
Other breeds	11,539	10,734	5,480	4,309	686	20,460
Totals, 1915	113,373	88,164	41,905	37,078	7,437	134,903
„ 1914	117,704	89,610	41,184	34,858	6,305	139,796

SHEEP AT THE PANAMA PACIFIC EXHIBITION.

IN the October issue of the *Journal* particulars were given of the stud sheep forwarded from New Zealand to San Francisco for entry in the live-stock competitions at the Panama Pacific Exhibition. The New Zealand Commissioner has since advised the Department by cable that the sheep have secured altogether twenty-four awards, including three championships, two reserve championships, and six firsts. Excluding one animal which died on the voyage, the sheep comprised thirty head, consisting of twenty-one Romneys, four Lincolns, and five Corriedales. Full particulars of the awards will be received by mail, and published in due course.

LIMESTONE FOR THE WAIRARAPA AND MANAWATU.

B. C. ASTON, F.I.C.

ONE of the most striking mistakes liable to be made by those interested in soil-improvement is to assume that because a district has abundant outcrops of limestone the soils of this area necessarily do not need lime. Instead of this being the case, in New Zealand the opposite is nearly always true. The reasons for this are several. One of these is that carbonate of lime is a soil-constituent which is most readily leached out of soils subject to a copious rainfall. An excellent instance of this is shown in the illustration, taken at the summit of the Mauriceville limestone hill. The outcrops of stone are pure carbonate of lime, and the soil must obviously have been derived from the limestone and the organic matter produced by the forest which grew on the top, yet the few inches of soil do not contain enough carbonate of lime to show an effervescence when acid is poured on to it.

A limestone dressing to pasture usually results in an increase in the clovers, and hence in the carrying-capacity of the land. Most Wairarapa soils should respond to a dressing of carbonate of lime, and it is a matter for some astonishment that so little is used in the district.

For agricultural purposes the limestone deposits of the Wairarapa, Manawatu Gorge, and Pahiatua districts must be accounted excellent in quality and abundant in quantity. The geographical distribution and arrangement of the deposits is, from the farmer's point of view, also good. There is scarcely any part of the Wairarapa or Manawatu which could not be supplied with limestone at a very reasonable rate. Where deposits of varying quality are superimposed one upon another the purest deposit is usually on the top of all, thus facilitating the working of the deposit, and allowing the removal of the stone without great expense in stripping valueless material. Further, in the drying, reducing, and sorting operations incidental in converting the stone into a marketable product masses of weighty raw material are naturally more easily worked from a height than from a depth. In other words, it is a great advantage to have gravity on one's side instead of against one.

The limestones of this district, moreover, are very easily reduced to a powder, comparing in this respect very favourably with such hard deposits as those of Te Kuiti, Nelson, Westland, and many other localities, where the limestone is massive and difficult to reduce to a powder.

MANAWATU GORGE DEPOSITS.

A demand for lime in the district served by the railway westward of the Tararua and Ruahine Ranges has lately focussed attention on the limestones which are the nearest to this fertile dairying district—viz., those at the Manawatu Gorge. The illustration gives some idea of the situation of one of these Gorge deposits, which is exactly opposite the Gorge Railway-station, fourteen miles



THE GORGE LIMESTONE DEPOSIT.

View showing the outcrop of limestone 40 ft. thick at the top of the hill above the fence.

from Palmerston North. The hill upon which the limestone occurs rises from the siding at the station to a height of about 150 ft., on the top of which is the purest stone. Hence the accessibility of this deposit is good, and Dr. Henderson, Government Mining Geologist, who, by arrangement with the Director of Geological Survey (Mr. Morgan), accompanied me on my tour of inspection, estimates it as being 40 ft. in thickness. The highest and purest stratum of stone on this hill contains 85 per cent. carbonate of lime. A sample taken in the stratum below this contained 74 per cent. This merges lower down into a calcareous sandstone containing numerous scattered siliceous stones. On the left, lower

down still, is a hill of conglomerate composed of well-rounded siliceous cobbles cemented together with a little carbonate of lime.

Railway Department's Quarry.—About half a mile nearer Woodville is a limestone face which the Railway Department has been for years working in obtaining a calcareous dressing for railway-platforms. This is a very friable damp deposit, samples containing from 15 to 20 per cent. moisture. After drying, this soft stone contains from 71.5 to 78.8 per cent. carbonate of lime. Picked samples could doubtless be obtained with a higher percentage (my samples were taken across the whole face). A sample from here, submitted by Mr. Escott, M.P., was found to contain 83.9 per cent. In 1912 a sample was submitted which contained 79.4 per cent. of carbonate of lime. Dr. Henderson reports, "This locality



THE GORGE LIMESTONE DEPOSIT.

Showing the valueless conglomerate hill fenced off on the right. On the left is seen a portion of the good limestone. This view also shows the easy accessibility of the deposit to the railway.

is much better suited for the opening of a quarry for the supply of ground limestone than that at The Gorge. Not only is the rock here more friable, but it contains less grit and few pebbles, while the amount available is many times greater." This deposit is worked on the same level as the railway-line to which it is contiguous.

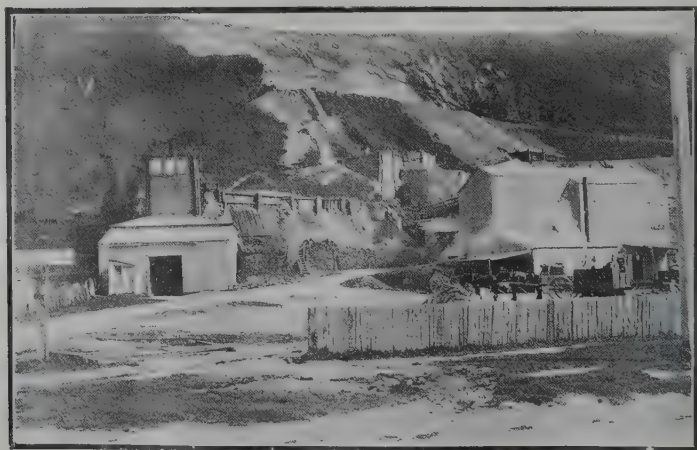
NGAWAPURUA DEPOSIT.

About a mile north of Ngawapurua Railway-station (three miles south of Woodville) is an outcrop of a calcareous nature. This

has in the past been used by the Railway Department, but is now abandoned. Analysis of a composite sample taken from all parts of the outcrop only showed 40.24 per cent. carbonate of lime. The question of working this low-grade deposit for agricultural purposes when much better grades are available a few miles away is therefore finally disposed of.

PAHIATUA AND MAKURI GORGE DEPOSITS.

In the above districts there is a plethora of valuable limestone, some of which is high grade and of exceptional friability. Unfor-



MAURICEVILLE LIME-WORKS, WAIRARAPA.

Showing quicklime-kiln on extreme left, drying-kiln in middle, and grinding-shed on right. The railway runs parallel to the road in the foreground. The 96-per-cent. limestone is drawn from the quarry-face at top of hill.

unately, the deposits are some distance from the railway-line. Thus at the Konini waterworks there is a deposit of calcareous sinter or travertine containing 91 to 96 per cent. of carbonate of lime in a form which would be reduced to a fine powder with the greatest ease. In the same locality are cliffs of hard limestone similar to that of Mauriceville, of 91 per cent. carbonate of lime. At Ballance there is another similar deposit of hard stone containing 94.3 per cent. carbonate; but, best of all, at the Pahiatua end of the Makuri Gorge is a soft, pure-white calcareous deposit

which contains 93.3 per cent. carbonate; that is, it is practically as rich as Mauriceville stone, and has the additional merit of being so soft that it may be rubbed down to a fine powder between the fingers.

I am much indebted to Mr. W. Wakeman, of Pahiatua, for great assistance rendered me in obtaining samples and locating suitable deposits in this district.



TOP OF QUARRY HILL, MAURICEVILLE.

Showing outcrops of pure limestone. The soil between the outcrops contains only 2 per cent. of lime in the first 4 in., showing effect of leaching.

MAURICEVILLE DEPOSIT.

Those who inspect the Mauriceville Lime Company's works are impressed with the wonderful natural facilities that exist for working the immense deposit of high-grade limestone which occurs there. This is an isolated hill, rising from the plain to a height of about 200 ft., composed of almost pure limestone. There is practically no stripping to do. It is an easy quarry to work, and the quality of limestone is high (about 95 per cent.). On quarrying, much (about one-third) of the material, which is remarkably uniform in composition, separates as powder, and could be successfully used for application to the land at once without further

reduction. At the foot of the hill, on a level with the kilns, is the railway-station, whence the privilege of 100 miles free carriage of treated limestone is allowed. What is required at Mauriceville is better machinery for reduction of the stone to a fine powder, and this improvement will, I hope, shortly be effected. Dr. Henderson reports, "The Mauriceville deposit contains an immense tonnage of high-grade limestone, and is admirably situated for cheap exploitation. With more up-to-date methods of quarrying and modern drying machinery ground limestone could be produced at a materially reduced cost."

SOURCE OF LIME FOR MANAWATU FARMERS.

Before describing further deposits it is advisable to discuss the factors which should determine the choice of a source of lime and limestone for Manawatu farmers. The main points to be considered are the distance from the consumer, the chemical composition, and the fineness of the materials.

Mauriceville quicklime and ground limestone, being carried free for 100 miles on the Government railways, are thus delivered without freight charges as far as Te Horo (via Woodville) and Plimmerton (via Wellington) in the south, the points between these stations having to pay freight; but all stations between the Gorge and Te Horo and between Plimmerton and Wellington would be served free. To Foxton, the terminus of that railway in the west, to Wangaehu on the New Plymouth line, and to Hunterville on the Main Trunk line in the north, the goods would also be delivered free. The distance therefore can be eliminated as a factor.

The next point is the chemical composition, and here it must be remembered that Mauriceville lime is at least 10 per cent., and more probably 15 to 20 per cent., better in quality than the Gorge stone. If, however, the Gorge material is permitted to be carried free (which is extremely doubtful) in the raw wet state, the Mauriceville product would be nearly 30 per cent. superior. When the extra amount of labour and material involved in handling, bagging, carting, and distributing 20 per cent. (or 1 ton in every 5) of the Gorge stone is considered, it will be seen that the advantage is largely with the Mauriceville stone, assuming that the cost of working would be similar.

Finally, as to fineness, the Mauriceville Company is selling, at 12s. 6d. per ton, the kiln-dried ground limestone, which may be regarded for purposes of comparison as 100 per cent. fineness and chemical composition. A quotation obtained by the courtesy of the Railway Department for a few trucks of the unscreened soft

Gorge stone containing much hard stone was 15s. per truck (6 tons) plus freight. Assuming this to be 3s. 6d. per ton for fifty miles, the unscreened wet stuff would cost 6s. per ton delivered, assuming that it contained as much as 50 per cent. of available carbonate of lime, which seems a liberal estimate, considering that the dried, unscreened stuff would probably not average more than 75 per



MR. W. HUME'S OUTCROP OF SOFT LIMESTONE, PIRINOA, LOWER WAIRARAPA.

Photos by B. C. Aston.

cent. total carbonate of lime. This would mean that the raw Gorge stuff would cost the farmer equal to 12s. per ton, and he would have all the additional expense that handling a raw, unbagged, low-grade product involves. It will be observed that freight is charged in this case, as the Railway Department does not at present carry raw untreated limestone free.

PIRINOA DEPOSITS.

The selection of a suitable source of limestone for that portion of the Lower Wairarapa comprising the lands adjoining the south-western shores of the lake has recently engaged my attention. At Pirinoa two eligible sites were selected, the uppermost soft strata of which contain about 80 per cent. carbonate of lime. Very little crushing would suffice to reduce these soft deposits to a form suitable for immediate application to the land, and experiments should undoubtedly be instituted to demonstrate the value of this local limestone.

I have to thank Mr. and Mrs. Holmes Warren, of Pirinoa, for much kindness and assistance when examining these deposits.

ANALYSES OF LIMESTONES FROM WAIRARAPA, WOODVILLE, AND PAHIATUA DISTRICTS.

Laboratory No.	Locality.	Insoluble Matter (Sand, &c.).	Alumina and Iron Oxides.	Calcium Carbonate (CaCO ₃).	Magnesium Carbo- nate, &c.	Approximate Yield of Quicklime (CaO) in Cal- cined Limestone.	Remarks.
	<i>Woodville County.</i>	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	
G 437	Ngawapuru ..	54.9	4.0	40.2	0.9	..	Medium hard stone.
366	From Manawatu Gorge— Top of outcrop above Gorge Station	11.4	2.3	85.1	1.2	76	
367	Taken below G 366 ..	21.9	2.9	73.9	1.3	61	
368*	Railway-siding ..	19.6	3.6	75.7	1.1	63	Soft deposit, containing 10.1 per cent. water. Analysis of dried sample.
369*	From cave, railway-siding	23.1	4.6	71.5	0.8	59	Very soft calcareous deposit, con- taining 14.2 per cent. water. Analysis of dried sample.
384	Railway Department's quarry	17.0	3.1	78.8	1.1	67	
385	Top of cliff above Gorge Station	16.8	3.2	79.2	0.8	68	
	<i>Pahiatua County.</i>						
G 501	No. 2 pit, Konini Road ..	6.5	1.6	91.0	0.9	85	Fairly hard stone.
502*	Above Pahiatua Waterworks, Konini	7.4	1.5	90.0	1.1	83	Soft secondary calcareous sinter. Analysis of sample dried to constant weight. Contained 21.7 per cent. water.
503	Makuri Gorge ..	4.6	1.3	93.3	0.8	89	Soft limestone.
504	Ballance ..	3.6	1.4	94.3	0.7	90	Very hard stone.
444	Konini gravel-pit ..	21.4	2.3	70.7	5.6	58	Shelly conglomerate.
445	Near Konini Waterworks ..	13.0	2.3	83.3	1.4	74	
446	" " " " ..	0.7	2.7	96.1	0.5	93	Fairly soft stone.
447	Between Mangatainoka and Pahiatua	22.5	2.6	72.4	2.5	59	Hard stone.
	<i>Mauriceville County.</i>						
G 370	Mauriceville ..	3.6	1.8	92.8	1.8	88	Kiln-dried stone.
372	" ..	0.6	0.6	98.7	0.1	98	Calcareous sinter.
436	" ..	4.7	1.7	93.3	0.3	88	Kiln-dried stone.
	<i>Featherston County.</i>						
G 495	Pirinoa ..	29.4	3.6	60.7	6.3	46	Soft limestone.
496	Pirinoa (from cliff above G 495)	15.4	2.2	79.2	3.2	68	Medium stone.
497	Pirinoa (from highest part of cliff)	12.6	2.3	82.9	2.2	73	"
498	Pirinoa ..	15.4	2.1	79.0	3.5	68	Fairly hard stone.

* Analysis made on the sample dried to constant weight on water-bath.

NOTE.—The above analyses are recent, and are not included in the North Island limestone tables published in the September last issue of the *Journal*.

SHEEP - DIPPING.

J. L. BRUCE.

UNDER present conditions, when economy in general is, or should be, the watchword, there are exceptions, and if there is one exception above all others applicable to the agricultural and pastoral community of the Dominion at this time it is expressed in the words "Do not economize in the purchase of sheep-dip."

Dipping, properly carried out, repays its cost many times over, and a few notes on the subject may be useful to the more or less inexperienced sheepowner.

Dipping not only improves the condition of the wool, but it stimulates a healthy action of the skin, and consequently increases the rise of yolk and the weight of the fleece. Taken at the conservative estimate of an average of 1d. per pound weight on the wool-clip of the Dominion, and, say, a half-pound more wool per sheep, the increased value resulting from consistent dipping would mean over £1,500,000 sterling to our credit for the year. This may to some appear rather a high estimate, but the statement can easily be confirmed during the wool season by a personal inspection at any of the wool-stores in the Dominion, where the comparative results to be seen will be sufficient to convince the most sceptical.

Whatever dip is used, carefully follow the directions accompanying it. These directions are arrived at after years of careful study by the manufacturers, and are not given to be improved upon at the discretion of the users.

Dip at least twice a year. Ewes and lambs may be dipped with a non-poisonous dip after the ewes are shorn. Another dipping with a poisonous dip about two months after shearing may be sufficient for the ewes; but the lambs (hoggets) should be dipped twice in the autumn, first with a non-poisonous dip, and then with a poisonous dip, and not less than fourteen days nor more than a month should intervene between the dippings. The whole flock should be dipped twice similarly, with the exception of the ewes dipped off the shears, for which one autumn dipping with a poisonous dip may be found sufficient.

Care should be taken to immerse thoroughly. Keep the crutch going. The time in the bath should be one minute.

Do not dip ewes immediately before putting to the ram. Several weeks should intervene.

Dip when the sheep are in a normal condition, the wool dry, and the weather mild.

Dip rams early. On no account should they be dipped after they are in condition for the season.

CROPS FOR DAIRY-FARMERS.

R. E. FAIRFAX-CHOLMELEY.

OWING to the high price of land the necessity for more intensive cultivation is apparent to those engaged in dairying. It is admitted, of course, that action in this direction is handicapped by the labour question, while the present high price of certain seeds and fertilizers also acts to some extent as a deterrent.

In suggesting the cropping scheme set out below, consideration has been given to the following points:—

(1.) The crops are those that will give feed throughout the year, especially during those months when there is the least grazing obtainable from the permanent pastures: also the ~~the~~ ^{the} require the minimum amount of ~~the~~ ^{the}.

(2.) The crops have been placed in such an order as to rotate, and green manure is provided in the cheapest form.

(3.) By growing oaten chaff and lucerne to feed with the root crops and ensilage a more balanced ration is provided.

In order to obtain the maximum benefit the land must be reasonably well cultivated, and suitable manures used. In nearly all cases lime is required. If the land is light, as in Taranaki (the writer's district), fine ground limestone (carbonate of lime) should be used, not burnt lime.

The subdivision of the dairy farm into fairly small fields will materially assist in the work of intensive cultivation. Good substantial fences should be erected. Poor fences mean endless repairs, and often the ruin of a crop by cattle trespassing.

The success of a crop depends to a great extent on the cultivation the land receives both before and after sowing. Too great importance cannot be attached to the cultivation and cleaning of a crop, and this is where the labour question most affects the farmer. More failures are due to the want of cleaning and thinning at the proper time than any other cause. It is well to remember that a crop of half an acre well cultivated is better than one acre neglected.

Supposing the case of a farm of 60 acres subdivided into two parts—20 acres for cultivation, and 40 acres in permanent grass for grazing—the following are the crops suggested. The 20 acres are divided into four fields of 5 acres each, and it will be seen that the crops can follow each other.

	Field A.	Field B.	Field C.	Field D.
First year..	Swedes and mangels	Oats, clover ..	Soft turnips, or chou moellier, or maize	Italian rye-grass and clover.
Second year	Oats, clover ..	Soft turnips, &c. ..	Italian rye-grass and clover	Swedes.
Third year	Soft turnips, or chou moellier, or maize	Italian rye-grass and clover	Swedes	Oats, clover.
Fourth year	Italian rye-grass and clover	Swedes and mangels	Oats, clover	Soft turnips or chou moellier.

Swedes would be sown at the end of November or in December; oats and clover in August, the aftermath of clover being ploughed under for green manure; soft turnips in October to November (or if chou moellier is used, September to October); Italian rye and clover about April.

These crops will provide feed as follows:—

During the months of June, July, August, and September swedes and mangels from field A, also chaff from field B, and hay and ensilage from field D. During October, November, December, and January there should be sufficient grazing from the permanent fields. During February, March, April, and May fields C and D will be utilized.

With regard to the use of soft turnips, my experience has been that the milk is not tainted if cows are carefully fed after milking. It is a crop that requires the least labour of any, and gives a good yield. Cows can be grazed on the crop, or the roots can be carted out. If the latter method is used, it is good farming to cart off five or ten rows, and to leave five or ten alternatively to be grazed. By this method the land is not impoverished to the same extent as if all the crop was carted off.

Maize has been rather an uncertain crop in North Taranaki during the last few years, and requires a lot of handling. Chou

moellier is coming more into favour. I have found that by nipping out the heads the foliage is increased and the stalk decreased. Carrots have not been mentioned on account of the labour they entail, although there is no crop to equal them for milking-cows. Tares have not been included, on account of the high price ruling for seed.

In addition to these crops every farmer should endeavour to establish a plot of lucerne. Its feeding-value is of such a high degree and its yield so much in excess of other fodders that it will handsomely pay the farmer for the time and labour expended if he is successful. Clean land and a plentiful dressing of lime are the chief essentials. A crop of potatoes or carrots, or any crop that requires constant cultivation, followed by one or more smother-crops ploughed in is the best method of preparing the ground. It is not every kind of land that will grow payable crops of lucerne. Those lands that contain lime, and the subsoil of which is fairly light or of a gravelly nature, are the most suitable.

It must be distinctly understood that no hard-and-fast rule can be given for the exact amount of food required to be grown. This depends on climate, soil, and number of stock to feed, and can only be estimated accurately by the farmer himself, with direct experience and knowledge of the land and his requirements.

Appended is a suggested cropping-scheme for a 60-acre farm all under cultivation. Modifications to suit special conditions could, of course, be introduced.

Field A (10 acres): Swedes and mangels. Sow in November or December.

Field B (10 acres): Italian rye-grass and clover. Sow in August.

Field C (10 acres): Turnips, chou moellier, maize. Sow at different dates between October and December.

Field D: Oats and clover. Sow in spring. After being grazed and harrowed, the aftermath of clover to be ploughed under.

Field E: Temporary pasture for hay or ensilage.

Field F: Temporary pasture for grazing.

These crops will give feed as follows:—

June, July, August, and September—Swedes, mangels, ensilage, and chaff.

October, November, and January—Ensilage, grass, chaff, grazing field B.

February, March, April, May—Soft turnips, chou moellier, maize, chaff; grass, fields B, D, and E.

CERTIFICATE-OF-RECORD DAIRY COWS.

W. M. SINGLETON.

DURING the past few weeks work in connection with the semi-official testing of purebred dairy cows has been at high pressure. The appended list of cows is good evidence of the number of certificates which have been going to breeders. Not only in numbers is the list strong, but the credited yield of fat testifies to very satisfactory quality.

JERSEYS.

In the class for two-year-old Jerseys Mr. C. A. Willis's Snow Queen's Fancy has, considering her age, placed a very fine record to her credit. Her record for milk-production will appeal to those who prefer quantity to a high percentage of butter-fat in Jersey milk. Her milk-record is the best we yet have for a Jersey commencing under two years of age.

Belvedere Sungleam, owned by Mr. E. B. Eagle, of Carterton, has to her credit the highest Jersey record which we publish this month. The illustration of this cow evidences an animal of capacity, and her record further attests this fact. Belvedere Sungleam displaces as class-leader Worksop Belle, a cow which gave 624.34 lb. fat. A close competitor, it will be noticed, was Twylish's Maid of all Work, owned by Wren Bros., Tokaora.

FRIESIANS.

Among the junior two-year-old Friesians the record of Friesland Tirania is outstanding. This heifer is an acquisition to Southland, where purebred dairy cattle are represented in numbers altogether too few. She is owned by Mr. R. K. McDonald, of Edendale, he having purchased her from Mr. W. I. Lovelock, who bred her. The senior three-year-olds have two records over 500 lb. butter-fat. Lady Kathleen, owned by Messrs. Best Bros., of Te Horo, is among the few with over 600 lb. of butter-fat to their credit. On their first season's testing these breeders have done good work.



BELVEDERE SUNGLEAM.

Owned by E. B. Eagle, Carterton. Days in milk, 365. Pounds milk, 11,044.8.
Pounds fat, 626.46. Age, 3 years 329 days. Standard, 309.9 lb. fat.



LADY PEGGY.

Owned by E. Griffiths, New Plymouth. Days in milk, 365. Pounds milk, 8,265.1.
Pounds fat, 534.31. Age, 1 year 308 days. Standard, 240.5 lb. fat.

Woodcrest de Kol Cornella, of the Weraroa herd, has placed a good businesslike record to her credit for a three-year-old milked twice a day and grazing under ordinary conditions.

The senior four-year-olds have a new leader in Mr. C. A. Hopping's Grace Fayne of Ashlynn. Her record is all the better in that it represents only fifty weeks' production. Mr. Hopping's cows have certainly enhanced the reputation of the breed during the past year.



LADY OF CLIFFSIDE II.

Owned by W. I. Lovelock, Palmerston North. Days in milk, 365. Pounds milk, 16,320.5. Pounds fat, 535.22. Age, 2 years 117 days. Standard, 252.2 lb. fat.

AYRSHIRES.

The list of Ayrshires contains a leader in the four-year-old class. This four-year-old, Alexandra of Waipapa, owned by Mr. F. Mills, Hawera, is also the highest record Ayrshire to date. A good illustration of her appeared in the October issue of the *Journal*.

In the mature class Bonny of Townhead, also owned by Mr. Mills, has been doing good work. This record places her second in her class, she displacing Messrs. Watt Bros. Fancy IV of Cambridge, which has a certificate for 492 lb. fat.

LIST OF RECORDS.

Name of Cow.	Name and Address of Owner.	Age at starting Test.	Fat req'd. for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
JERSEYS.						
<i>Two-year-old Class.</i>		Yrs.Dys.			lb.	lb.
Snow Queen's Fancy	C. A. Willis, Pukekohe	1 353	240.5	365	8747.20	518.40
Stevenson's Maggie..	Wren Bros., Tokaora..	2 354	275.9	365	7197.20	427.93
Cicero's Lass ..	E. Griffiths, New Ply-mouth	2 31	243.6	320	6957.20	418.07
Wattles ..	F. C. Ross, Kiwitea ..	1 340	240.5	365	6840.80	410.75
Belvedere Silver Pet	E. Eagle, jun., Carter-ton	1 280	240.5	365	6237.70	365.45
Grannie's Nancy ..	E. Griffiths, New Ply-mouth	2 29	243.4	339	6754.00	360.05
Tui ..	W. G. Reece, Opotiki	2 347	275.2	320	6006.30	358.66
Venus of Bull's ..	Dr. F. J. Watson, Bull's	1 354	240.5	365	5501.70	348.16
Miro Meadows Fancy	A. A. Ward, Miro, Taranaki	1 352	240.5	365	5151.20	330.54
Fox's Molly ..	S. R. Lancaster, Pal-merston North	2 56	246.1	316	5478.90	310.95
Caifus ..	A. Banks and Son, Kiwitea	2 288	269.3	345	5752.20	295.30
<i>Three-year-old Class.</i>						
Belvedere Sungleam	E. B. Eagle, Belvedere, Carterton	3 329	309.9	365	11044.80	626.46
Twylsh's Maid of All Work	Wren Bros., Tokaora, Hawera	3 301	307.1	365	10617.40	600.45
Grand Duchess ..	Curtis Estate, Inglewood	3 345	311.5	365	8482.00	508.33
Eminent's Mozelle ..	C. G. C. Dermer, Wai-piko	3 305	307.5	365	9027.00	494.42
Fox's Sybil ..	E. S. Lancaster, Levin	3 305	307.5	365	8589.70	452.17
Campanile's Goldie ..	A. Guy, Palmerston North	3 8	277.8	364	8179.80	448.21
Miranda ..	Ditto ..	3 107	287.7	365	5704.80	427.01
Clemora ..	R. J. Linn, Normanby	3 285	305.5	324	7854.60	413.96
Campanile's Palm ..	W. N. Stephenson, Tariki	3 354	312.4	355	6236.70	373.34
Richmond Rose ..	R. J. Linn, Normanby	3 268	303.8	332	6864.70	370.11
Nellie ..	W. G. Reece, Opotiki	3 20	279.0	349	6445.90	367.84
Cardiff Spec ..	E. O'Sullivan, Cardiff	3 353	312.3	360	5641.00	367.59
Planet ..	R. J. Linn, Normanby	3 301	307.1	318	6214.10	360.39
Lilian ..	J. Penney, Blenheim..	3 7	277.7	365	5458.80	343.93
Maitland Fairy Chase	R. Thompson, Opotiki	3 21	279.1	320	5985.40	319.09
<i>Four-year-old Class.</i>						
Magnet's Vixen ..	J. B. Clemow, Stratford	4 347	348.2	365	9622.00	557.80
Silver Topsy ..	E. S. Lancaster, Levin	4 147	328.2	363	8898.30	439.58
Mercedes Noble Queen	E. Griffiths, New Ply-mouth	4 157	329.2	318	7352.20	437.89
Tuna ..	A. A. Ward, Miro ..	4 345	348.0	365	6481.10	437.74
Vesta's Campanile ..	R. J. Linn, Normanby	4 2	313.7	315	7696.40	371.28
<i>Mature Class.</i>						
Carnation's Viola ..	P. J. Petersen, Mid-hirst	6 284	350.0	363	9696.40	559.95
Nukumaru Primrose I	H. Stratford, Awapuni	6 364	350.0	365	8424.40	547.82

Name of Cow.	Name and Address of Owner.	Age at starting Test.	Fat reg'd. for Cert.	Yield for Season.		
				Days.	Milk.	Fat.

JERSEYS—continued.

		Yrs.	Dys.		lb.	lb.
<i>Mature Class—cont.</i>						
Psyche	A. A. Ward, Miro ..	5	331	350.0	365	8373.60
Waif's Glory ..	..	5	301	350.0	365	8882.10
Ravenswood Queenie	A. "Guy, Palmerston North	7	255	350.0	365	8364.70
Ruby Rose ..	C. G. C. Dermer, Wai-piko	7	119	350.0	348	9307.00
Darkie XXII ..	S. R. Lancaster, Palmerston North	10	316	350.0	336	7696.50
Trixie Belle ..	J. Penney, Blenheim	6	364	350.0	365	7460.50
Floss III ..	A. Banks and Son, Kiwitea	12	10	350.0	312	9128.60

FRIESIANS.

		Yrs.	Dys.		lb.	lb.
<i>Junior Two-year-old Class.</i>						
Friesland Tirania ..	R. K. McDonald, Edendale	1	345	240.5	365	15538.25
Westmere Duchess V	J. Donald, Westmere	1	304	240.5	365	13724.80
Espoir of Rotaekanae	S. R. Solley, Riverlea	2	120	252.5	365	12176.10
Westmere Princess Pietertje	J. Donald, Westmere	1	236	240.5	303	11113.70
Blanco Van Tromp	Best Bros., Te Horo	2	54	245.9	327	9575.60
Domino Queen ..	J. Donald, Westmere	2	181	258.6	334	8860.80
<i>Senior Two-year-old Class.</i>						
Brookland Johanna Pietertje	J. Donald, Westmere	2	251	265.6	305	10959.80
Beauty de Kol Burke	J. H. Parkinson, Opotiki	2	274	267.9	365	10816.40
Belle of Monavale ..	C. C. Buckland, Cambridge	2	247	265.2	365	6776.40
<i>Junior Three-year-old Class.</i>						
Dominion Thora ..	Weraroa Experimental Farm, Levin	3	9	277.9	344	10472.25
Woodcrest Pietje Columbia	J. Donald, Westmere	3	85	285.5	298	11491.10
<i>Senior Three-year-old Class.</i>						
Lady Kathleen ..	Best Bros., Te Horo	3	285	305.5	365	13539.55
Woodcrest de Kol Cornella	Weraroa Experimental Farm, Levin	3	195	296.5	365	16864.00
Beauty ..	S. R. Solley, Riverlea	3	274	304.4	365	13325.20
Woodcrest A g g i e Grace	Weraroa Experimental Farm, Levin	3	283	305.3	340	11680.00
Bonny Belle Lady ..	H. Johnson, Stratford	3	274	304.0	365	10228.40
Florida ..	J. Boag, Brookside	3	193	296.3	257	8438.10
<i>Junior Four-year-old Class.</i>						
Bangle de Kol ..	J. H. Parkinson, Opotiki	4	39	317.4	303	9696.70
<i>Senior Four-year-old Class.</i>						
Grace Fayne of Ashlynn	C. A. Hopping, Rangitikei Line, Palmerston North	4	302	343.7	351	17934.00

Name of Cow.	Name and Address of Owner.	Age at starting Test.	Fat rec'd. for Cert.	Yield for Season.		
				Days.	Milk.	Fat.

FRIESIANS—continued.						
<i>Senior Four-year-old Class—cont.</i>		Yrs.Dys.			lb.	lb.
Lovely II	J. H. Parkinson, Opo-tiki	4 336	347.1	365	12972.90	457.82
Duchess	H. Johnson, Stratford	4 280	341.5	364	11935.30	382.61
<i>Mature Class.</i>						
Lady Van Cleve ..	W. I. Lovelock, Palmerston North	7 154	350.0	365	15459.00	528.27
Daisy	Weraroa Experimental Farm, Levin	Aged	350.0	365	16231.25	458.66
Our Lady	R. Gilmour, Tiakitahuna	7 9	350.0	365	10853.50	416.87

AYRSHIRES.						
<i>Two-year-old Class.</i>						
Queen of the North of Ayrshire Moor	F. C. Litchfield, Hamilton East	2 355	276.0	334	8408.90	319.56
<i>Four-year-old Class.</i>						
Alexandra of Waipapa	Fred Mills, Hawera ..	4 348	348.3	365	14348.60	591.16
<i>Mature Class.</i>						
Bonny of Townhead	Fred Mills, Hawera ..	6 304	350.0	365	12833.20	496.62

AGRICULTURAL LEGISLATION OF 1915.

T. D. H. HALL.

NATURALLY the war and questions arising therefrom overshadowed everything else during the parliamentary session of 1915, and many matters that normally would have been dealt with had to stand over. The Department had drawn up a fairly large programme, but there was no opportunity of dealing with most of the measures concerned, and the legislation promoted by the Department that was actually passed was comparatively small. The following is a short statement of the measures enacted:—

THE DAIRY INDUSTRY AMENDMENT ACT.

This Act deals with two questions. In the first place it sets out more definitely the powers of the Department in regard to moisture in butter. It is made quite clear that an offence is committed if butter containing more than 16 per cent. of moisture is sent to a grading-store for grading. The Grader is also given power to order the disposal of the butter, or to treat it so as to

ensure that it does not leave the Dominion with an excess of moisture. The second matter deals with a new phase of the dairy industry. The high prices for our butter and cheese have stimulated production, and several small private factories have sprung up or are being erected. The usual desire is to build these as rapidly as possible, and too little attention is paid to construction and equipment. The result will be later that the conditions at these factories will not be such as to enable a first-class article to be turned out. In the case of co-operative ventures the advice of the Department is almost always sought and readily taken. The Act provides that it may be made compulsory for all sites of factories, all buildings and equipment, to be approved beforehand by the Minister of Agriculture, thus enjoining on all what is now almost universally practised.

THE FRUIT-PRESERVING INDUSTRY AMENDMENT ACT.

This is a short measure containing a provision of interest to fruitgrowers. The main Act provides for the making of advances on easy terms to fruitgrowers, associations of fruitgrowers, or to companies for the purpose of erecting cold stores for fruit and for fruit-preserving works. The applicants for the loan must, however, possess the freehold of the site for the works, this being the basis of the security. The Amendment Act allows of a loan being made on the security of an approved leasehold site. It may well be, and is actually the case in an instance before the Department, that the best site for a works is on part of a Harbour Board's endowment, of which the freehold cannot be obtained but of which a lease on satisfactory terms can be secured. The Minister of Agriculture may now, if satisfied as to the tenure, grant a loan in such cases.

THE SALE OF FOOD AND DRUGS AMENDMENT ACT.

This measure is of interest mainly to poultry-farmers. It deals with a position that the exceptional conditions of last year rendered acute. The high prices ruling for some months in New Zealand for eggs attracted considerable quantities from North America. These came in cold storage, and were largely sold as new-laid eggs. The competition of these eggs seriously affected local poultry-keepers, who were suffering from the high prices ruling for all classes of food. The Act is designed to ensure that imported eggs shall be sold as such. It provides that regulations may be made prescribing the marking or stamping of articles of food so as to indicate the fact of their importation and the country of origin. Such regulations are in course of preparation.

RECLAMATION OF SWAMP LAND.

A WELLINGTON - WEST COAST NOTE.

J. W. DEEM.

ON the west coast of the North Island, in common with many other parts of New Zealand, there are large areas of swamp land the great bulk of which until a few years ago was in its natural state, except that a little surface sowing had been done. Of recent years, however, a great deal of this class of land has been transformed from almost useless rough grazing-country to good bullock-fattening land. As there are still large areas of these swamps awaiting development, a few notes on the procedure adopted for their reclamation may be of interest and use.

Having decided to deal with a certain area, the first matter for attention is drainage, and as this is naturally the most important factor in the reclamation of swamps, great care should be given to carrying out the work properly. To begin with, large open drains are constructed, so arranged that they will act as leaders from every part of the area. When it is not the intention to tile and cover in the lateral ditches an endeavour should be made to place them in positions where they will inconvenience the ploughing as little as possible. When the drains are completed all scrub and large bushes of flax, toetoe, and other rough growth is cut down and, as soon as dry enough, burnt off.

If the draining has been done during the summer, the swamp should be dry enough to plough the following spring. A heavy single-furrow swamp plough is found most suitable for the work, and four heavy or six medium draught horses will be required to draw it. The plough should be set to turn a furrow of from 16 in. to 18 in. wide and from 4 in. to 5 in. deep. Here great care is necessary to see that the set of the plough is such that the furrow will be turned completely upside down, thus covering all vegetation. At the end of each week all ploughed land should be rolled with a heavy roller to press the furrows well down. This operation is important, as it excludes the light, thus preventing any growth between the furrows and assisting the rotting of the buried vegetation.

As seeding-time approaches the land is disked until a good seed-bed is procured, the finer the better. Usually from three to four strokes are required. The ground is now ready for sowing, and



RECLAMATION OF SWAMP LAND.
Cutting scrub and rough vegetation.



DRAIN CUT THROUGH SWAMP.
On left, reclaimed land in turnips; on right, land still in the rough.

if it has been properly worked there should be sufficient tilth to allow the seed to be drilled in. If, however, the paddock is very rough it may be found more convenient to sow broadcast. Swedes are generally the best crop to sow on this class of land. An artificial manure should be sown with the seed; one of the best fertilizers for the purpose is basic superphosphate at the rate of from 2 cwt. to 3 cwt. per acre.

By the time the root crop has been eaten off the buried vegetation will have rotted sufficiently to allow the land to be ploughed with an ordinary double-furrow plough. The practice adopted by several successful farmers on this coast is to follow the root crop with a crop of rape, and after the first feeding of the rape the



CATTLE FEEDING-OFF THE FIRST TURNIP CROP ON RECLAIMED SWAMP LAND.

land is disked and sown with Italian rye-grass and clover, followed with a chain or brush harrow to cover the seed. The subsequent feeding of the rape consolidates the ground, and splendid crops of rye-grass and clover are obtained. If the rye-grass and clover are fed for two seasons, this brings us to the fourth year, when the swamp should be in a good state of cultivation, and may be used for further root crops or sown down in permanent pasture.

The views accompanying this note were taken on the farm of Mr. Hugh Middleton, Waverley, and show what can be done in one year. Mr. Middleton has successfully dealt with a considerable area of swamp land, and I am indebted to him for several valuable hints as to the treatment of these areas.

INTRODUCTION OF LIVE-STOCK, ETC.

THE NEW REGULATIONS.

THERE were recently issued new regulations under the Stock Act relating to the introduction of live-stock, hides, animal manure, &c., into New Zealand. The old regulations dated back to 1893, and had been so frequently amended that consolidation was urgently needed, and, in addition, changed conditions rendered amendments necessary. Some important amendments have been made, and it will be of interest to many farmers to have a short explanatory statement of the present provisions. For the purposes of the regulations live-stock are divided into two classes—Australasian, by which is meant live-stock that have been in the Commonwealth or the Dominion for at least six months, and foreign, by which is meant live-stock other than Australasian. There are special provisions to ensure the freedom from disease of foreign or Australasian live-stock that are allowed to be introduced.

LIMITATIONS OF IMPORTS.

The following will show from what countries live-stock of different kinds may be introduced, and what changes have been made from the existing practice :—

Horses, Asses, and Mules.—Horses and mules may now be introduced only from the United Kingdom, Canada, United States of America, New South Wales, Victoria, South Australia, and Tasmania.

Asses may be introduced from the above places, and, in addition, from France, Spain, and Portugal. Formerly horses could be introduced from all foreign countries except Africa and Java. The restriction has been found necessary as a safeguard against the introduction of disease.

Cattle.—Cattle may be introduced only from the United Kingdom and from Canada. In the interests of breeders the Department would have liked to add to the countries on which they could draw for new blood. Careful inquiries as to the prevalence of disease in different countries showed that the lifting of the embargo would involve too great a risk to the health of the Dominion's live-stock. Canada has,

however, been added to the list of foreign countries from which cattle may be imported. A most important amendment is the total prohibition of the introduction of cattle from the Commonwealth of Australia. Hitherto importation has been allowed from all States except Queensland and Western Australia. The Department was loath to take the step of enforcing total prohibition, but the spread of the parasite *Onchocerca Gibsoni* and the repeated outbreaks of pleuro-pneumonia in certain States have forced this action on the Government in the interests of maintaining the present comparative freedom of the Dominion from serious contagious diseases. The parasite *Onchocerca Gibsoni* causes the condition known as worm-nests in cattle, the brisket being the part usually affected. Though this parasitic affection does not cause sickness in the animal, its presence results in serious annual monetary loss to beef-producers, owing to the parts liable to be affected having to be cut away from all beef carcasses before being exported. It has been stated that in North Queensland alone, in one season, 10,000 tons of beef have to be converted into manure from this cause. Quarantine would afford no protection against the introduction of worm-nests into New Zealand, owing to the inability to detect their presence during life, hence it became a choice between total prohibition or the incurring of a very serious risk. It is believed that the parasites are spreading among cattle through the medium of blood-sucking insects of varieties which are present in New Zealand.

Sheep, Goats, and Swine.—Sheep, goats, and swine may be introduced only from the United Kingdom and from New South Wales, Victoria, South Australia, and Tasmania. This is as formerly, except in the case of swine. Hitherto swine were not allowed from any State of the Commonwealth except Tasmania. Control of swine-fever seems now to have been secured, and the introduction from the three States mentioned is permitted. This will be of benefit to breeders.

Dogs.—The introduction of dogs is permitted only from the United Kingdom and from New South Wales, Victoria, South Australia, and Tasmania. Previously dogs had been allowed from most foreign countries, but this has lately been a source of anxiety. Dangerous diseases are prevalent in many countries, particularly in tropical places, and stringent prohibition is necessary. Some imported dogs have had to be destroyed in quarantine here.

Deer or other Undomesticated Live-stock.—If these are for an acclimatization society, or for menagerie purposes, or for a zoological collection, they may be introduced from any foreign country, but under a special permit only.

QUARANTINE.

Some amendments have been made in the periods of quarantine imposed on imported live-stock, the aim of the Government being to reduce the cost to importers so far as is consistent with safety.

The quarantine period of horses, asses, and mules from the United Kingdom is fourteen days, but if the animals pass the mallein test on arrival in the Dominion they may be allowed to land without quarantine. On horses, asses, and mules from Canada, United States of America, France, Portugal, and Spain a quarantine of twenty-eight days is imposed. On cattle from Canada the period will be sixty days, and on cattle from the United Kingdom forty days, on sheep and goats from the United Kingdom twenty-eight days instead of sixty, and on swine from the United Kingdom fourteen days instead of sixty. The previous embargo having been removed from swine from Australia, as mentioned before, there is imposed as a precautionary measure against swine-fever a period of quarantine of thirty days. Sixty days' quarantine on dogs from the United Kingdom is provided, as against six months previously.

QUARANTINE CHARGES.

Some reductions have been made in the quarantine charges. The daily sustenance charge on cattle has been reduced from 1s. 6d. per head to 1s. On young pigs under two months old the charge of 3d. per head has been abolished. The charge on sheep from one to ten in number is now 3d. as against 6d., and on each additional head exceeding ten it is 2d. as against 4d. The daily charge for dogs is to be 4d. as against 6d.; while instead of a charge of 3d. on pups up to four months there will be no charge on pups under two months, and 2d. on pups from two to four months. The charge for dipping sheep has been reduced from 10s. for one sheep and 1s. for each additional head to 5s. for one and 6d. for each additional head.

FODDER, FITTINGS, ETC.

Fodder with live-stock may be allowed to be landed only if from the United Kingdom or from Australia (except Queensland and Western Australia). Special treatment is prescribed for fittings and other things proposed to be introduced with live-stock.

HIDES, SKINS, AND WOOL.

Hides or skins from foreign countries must, on being landed, be removed to a tannery or other place for treatment as prescribed. There are similar provisions in regard to hides and skins from Queensland or Western Australia. Wool may be introduced from New South Wales, Victoria, South Australia, and Tasmania on a permit being obtained.

ANIMAL MANURE.

The conditions governing the introduction of animal manure remain much as at present, the two countries from which supplies may be obtained being India and Australia.

GENERAL.

The above summary indicates only the main provisions of the regulations. For details of the requirements the full regulations, which were published in the *Gazette* of the 7th October, 1915, must be consulted. Full particulars may be obtained from the Director of the Live-stock Division of the Department, Wellington, or from any Inspector of Stock or District Agent.

**FOOT-AND-MOUTH DISEASE: MODIFIED RESTRICTIONS
ON LIVE-STOCK IMPORTS FROM GREAT BRITAIN.**

OWING to several outbreaks of foot-and-mouth disease in Great Britain it was deemed advisable some little time ago to place certain restrictions on the introduction of live-stock from that country into New Zealand. Recently the British Board of Agriculture made representations that, in view of the satisfactory control of the disease established in Great Britain, the New Zealand restrictions were unduly severe. The New Zealand Department of Agriculture, after due consideration, proposed that such restrictions should be modified by reducing the radius of the district from which the importation of live-stock is prohibited from fifty to fifteen miles from the seat of the outbreak, and the period of the prohibition from six months to three months, the restriction regarding fodder to remain as before. The matter was placed in the hands of the High Commissioner in London, with authority to take action on the lines of the Department's proposals if he considered such course to be quite safe. A cablegram, dated the 23rd October, 1915, has been received from the High Commissioner giving his opinion that the Department's proposals would operate quite safely, and that he had accordingly published a notification to the following effect: (1.) Shipment will be stopped entirely for one month from date of outbreak of foot-and-mouth disease. (2.) After one month shipment may be resumed, provided that until three months from date of outbreak no animals which have been since such date within fifteen miles may be shipped. (3.) The fodder restriction is not altered. It may be mentioned that the existing conditions regarding fodder provide that such material must be the produce of some county in Great Britain where no outbreak of foot-and-mouth disease has occurred for six months prior to the date of shipment, and must be sent from such county direct to the ship's side.

Last month the Governor and Lady Liverpool paid a visit to the Ruakura Farm of Instruction. To commemorate the visit His Excellency, by request, kindly planted a kauri-tree, and Lady Liverpool planted a totara.

RENOVATION OF HILL PASTURES.

G. DE S. BAYLIS.

UNPLOUGHABLE hill pastures may be greatly benefited in the manner described below. The area to be treated is heavily stocked in early spring, and, as far as possible, weeds, rank growth, &c., eaten well back. Stock is then removed, and the paddock allowed to go to seed. If the proper time has been chosen for so doing, the first rush of growth will now be over, and the grasses will mature seed while only throwing up a medium growth of leafage. Thus there will be no fear of smothering, although the soil will be well shaded. When all the seeds are fully ripe, probably in most districts some time in February, the paddock is again heavily stocked with both sheep and cattle, and the seed is thus shaken out and trodden in, while the growth is being partly consumed and partly trodden down. This ensures the seed reaching the soil ready for the autumn rain. When this is accomplished the stock is removed and none allowed in the paddock until the young seeds are well rooted.

If it is desired to sow any additional seed or to top-dress the paddock with some slow-acting fertilizer, this may be done at one operation by mixing the two together and broadcasting the mixture after the paddock has been well trodden about by the stock. It is perhaps preferable to remove the stock for a short time until rain has washed the fertilizers off the leaves of the grasses, but the animals should be put back again before being finally removed, in order that they may tread in much of the seed thus broadcasted. If saving of labour is not essential, the seed should be broadcasted in the autumn while the stock are crushing down the growth, and the fertilizers can be sown later—say, about June.

Such periodical resting of hill pastures after a suitable period of years has elapsed would do much to retain them in good heart, and this is not an expensive method of treatment; but it is essential to success that the details be carefully watched, so as to ensure that the treatment given is sufficient to accomplish the object intended.

MAIZE-GROWING POINTS.

G. DE S. BAYLIS.

VERY few of the many dairy-farmers who grow a little maize for cow feed possess a proper maize-drill. Most of the small-corn varieties of maize can be sown through the ordinary grain-drill without much, if any, damage to the seed. Large-corned varieties, however, like Hickory King, often get broken in these drills, and the germination is much reduced thereby. Those whose land is clean and free from weeds, but who desire to intercultivate their crops and at the same time to grow as heavy a crop as possible without crowding the plants, may do so by drilling two rows 7 in. apart, and then leaving an interval of 28 in. between this pair and the next pair of rows. Two manure-tubes can easily be put in one coulter in most makes of drills when heavier manuring is desirable.

Warm sheltered spots with reflected heat from surrounding hills are ideal spots for growing tall heavy crops, although in districts subject to unseasonable frosts low-lying flats along stream-beds should be avoided. Wherever possible set the rows across the direction of the prevailing wind, and not with it. A breadth of peas sown round the outside of the maize-plantation forms a good shelter, especially if the peas be allowed to twine themselves up the outer row of maize. Thus the outer rows shelter the inner ones, and much of the wind is kept off the surface of the soil, thereby preventing undue evaporation.

Much weed-growth can be kept from between the plants by using the moulder, and slightly earthing up for the second cultivation instead of horse-hoeing. The hold of the plants in the ground is also thereby strengthened, and the anchor-roots thrown out by the maize secure a better grip.

OTAGO APPLES IN LONDON.

THE exhibit of apples illustrated on page 453 of this issue was arranged by the High Commissioner, on behalf of the Otago Expansion League and the Cromwell Development Company, at the Show of the Royal Horticultural Society, London, in August last. Great interest was shown in the collection, which was awarded the Banksian silver-gilt medal. The apples were grown by Tonkin's Trustees, Treliske Orchard, Ettrick; Mr. Albert Birch, Teviot; and the Upper Clutha Fruit-growers' Association.

POULTRY-FEEDING WITHOUT WHEAT.

THE MILTON EXPERIMENT.

IN the August issue of the *Journal* an account was given of the feeding experiment initiated by the Department at the Milton Poultry-station with a view to testing from an egg-production standpoint the result of eliminating wheat from the ration.

The results of the first twelve-weekly period were on all points slightly in favour of the birds fed without wheat. For the second period the position is reversed, the value of the eggs from the birds fed with wheat being in the aggregate 6s. 4²⁵d. in their favour, while the cost of production was also less by 4⁵⁸d. It may be noted that the price, as recorded, of all the cereal foods used has fallen in the second period, wheat itself showing a drop from 6s. 8d. to 5s. per bushel.

The results for the twenty-four weeks recorded are that while the cost of production of the eggs from the birds fed with wheat is 9⁶⁷d. in excess of that of the no-wheat pens, the gross profit from the wheat-fed birds is 2s. 11⁴⁸d. in their favour. The difference, however, between the two sets of birds is still slight. Details are given in the appended tables.

FEEDING EXPERIMENT AT THE MILTON POULTRY-STATION.—RESULTS FOR SECOND PERIOD OF TWELVE WEEKS, ENDED 15TH OCTOBER, 1915.

Record of Eggs laid.

Week ended	Birds fed with Wheat.		Birds fed without Wheat.	
	White Leghorns. (Pen No. 1.)	Brown Leghorns. (Pen No. 2.)	White Leghorns. (Pen No. 3.)	Brown Leghorns. (Pen No. 4.)
July 30 ..	35	33	31	18
Aug. 6 ..	39	32	33	23
" 13 ..	35	31	34	21
" 20 ..	35	25	32	23
" 27 ..	35	25	36	30
Sept. 3 ..	35	31	38	28
" 10 ..	40	34	38	31
" 17 ..	32	34	38	34
" 24 ..	35	25	34	25
Oct. 1 ..	35	34	33	29
" 8 ..	33	37	34	29
" 15 ..	37	32	33	33
Totals ..	426	373	414	324
Totals for first twelve weeks	352	237	328	278
Grand totals..	778	610	742	602

Number and Fair Market Value of Eggs laid.

Pens.		Eggs laid.	Value at 1s. 3d. per Dozen.	Average Eggs per Bird.	Average Value per Bird at 1s. 3d. per Dozen.
			£ s. d.		s. d.
No. 1	..	426	2 4 4.50	71.00	7 4.75
No. 2	..	373	1 18 10.25	62.16	6 5.70
No. 3	..	414	2 3 1.50	69.00	7 2.25
No. 4	..	324	1 13 9.00	54.00	5 7.50

Particulars of Foods used.

Food.				Pens Nos. 1 and 2.		
				Price.	Quantity.	Cost.
				£ s. d.	lb.	£ s. d.
Pollard	..	..	..	6 10 0 ton	69	0 4 5.82
Bran	..	..	..	5 0 0 "	26	0 1 3.60
Maize	..	..	..	0 6 0 bushel	25	0 2 8.15
Meatmeal	..	..	..	0 14 0 cwt.	23	0 2 10.50
Wheat	..	..	..	0 5 0 bushel	114	0 9 6.00
Totals	..	..	..	..	257	1 0 10.07

Food.				Pens Nos. 3 and 4.		
				Price.	Quantity.	Cost.
				£ s. d.	lb.	£ s. d.
Pollard	..	..	..	6 10 0 ton	59	0 3 10.02
Bran	..	..	..	5 0 0 "	22	0 1 1.20
Maize	..	..	..	0 6 0 bushel	25	0 2 8.15
Meatmeal	..	..	..	0 14 0 cwt.	22	0 2 9.00
Oats	..	..	..	0 3 4 bushel	96	0 8 0.00
Lucerne	..	..	..	8 0 0 ton	40	0 2 10.28
Totals	..	..	..	..	264	1 1 2.65

Comparative Summary.

Pens.	Value of Eggs laid.	Cost of Production.	Gross Profit.
	£ s. d.	£ s. d.	£ s. d.
Nos. 1 and 2 ..	4 3 2.75	1 0 10.07	3 2 4.68
Nos. 3 and 4 ..	3 16 10.50	1 1 2.65	2 15 7.85
Difference ..	0 6 4.25	0 0 4.58	0 6 8.83

RESULTS FOR TWENTY-FOUR WEEKS ENDED 15TH OCTOBER, 1915.

Period.	Pens.	Value of Eggs laid.				Cost of Production.				Gross Profit.						
		£	s.	d.	£/s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	
Twelve weeks ended—																
July 23 ..	1 & 2	4	9	11.80			1	5	4.50				3	4	7.30	
Oct. 15 ..	1 & 2	4	3	2.75			1	0	10.07				3	2	4.68	
					8	13	2.55			2	6	2.57		6	6	11.98
July 23 ..	3 & 4	4	12	6.9			1	4	2.25				3	8	4.65	
Oct. 15 ..	3 & 4	3	16	10.5			1	1	2.65				2	15	7.85	
					8	9	5.40			2	5	4.90		6	4	0.50
Differences	..				0	3	9.15			0	0	9.67		0	2	11.48

NOTE.—For the purpose of breeding from the pens under test a male bird has been continuously kept in each pen for the period under review. This reduces the cost of production by 6s. 7.22d. in the case of pens 1 and 2 and by 6s. 5.84d. for pens 3 and 4, consequently the gross profit is increased to this extent. The male birds have now been removed from the pens.

PRINCIPAL SPRAYING - COMPOUNDS.

DIRECTIONS FOR PREPARATION, ETC.

THE Department's bulletin dealing with the principal spraying-compounds for the control of insect and fungoid diseases affecting the orchard has been revised by a special committee of Orchard Instructors representing the Canterbury, Otago, North Auckland, Whangarei, and Hawke's Bay districts. The directions and procedure given in the bulletin, as set forth below, are recommended for the 1915-16 season's operations.

INSECTICIDES.

ARSENATE OF LEAD.

For codlin-moth, pear-slug, leaf-roller caterpillar, &c. Use not less than 1½ lb. avoirdupois of arsenate-of-lead paste, or 1 lb. of arsenate-of-lead powder, to 50 gallons of water. Commence spraying as soon as the majority of the petals have fallen, and continue the applications at intervals of about twenty-one days throughout the season, the main object being to keep the fruit thoroughly covered with the spray.

MISCIBLE OILS.

Contact insecticides for the destruction of sucking-insects, including the scales, aphides, and mites.

RED-OIL EMULSION.

For application whilst deciduous trees are in a dormant state.

Proportions: 1 gallon red oil, 1 lb. good soft-soap, 12 gallons water.

Preparation: Place the oil and soap in a vessel; heat over a fire until the soap is dissolved; remove from fire, and with spray-pump thoroughly agitate the contents, at the same time slowly adding ½ gallon water; add 11½ gallons cold water, and the mixture is ready for use.

It is imperative that the water used should be soft; where it is questionable add 2 oz. washing-soda to every 5 gallons water. Rain-water is always to be preferred for the mixing of spraying-compounds.

In some districts the use of this spray in a ratio of 1 to 8 has proved more satisfactory for the destruction of sucking-insects, especially red mite and woolly aphis.

For the destruction of scale insects attacking citrus fruit-trees this emulsion is recommended in the ratio of 1 to 25 from May to August.

COMMERCIALLY PREPARED MISCIBLE OILS.

There are numerous brands of commercially prepared oils on the market needing only the addition of the necessary quantity of soft water, as recommended above, to be ready for use.

KEROSENE EMULSION.

A spring and early summer remedy for scale and thrip on citrus and deciduous fruits.

Proportions: Kerosene, 2 gallons; common soap, $\frac{1}{2}$ lb.; boiling water, 1 gallon.

Preparation: Place the soap in the water, which should by preference be rain-water. Hard water is unsuitable, but if only such is to be had, make it soft by adding some soda. Boil till the soap is thoroughly dissolved; then take it off the fire and pour the solution into the kerosene; thoroughly churn up by placing both suction and delivery ends of the spray-pump hose in the liquid and pumping steadily for a few minutes. The emulsion should then, if perfect, form a cream, which thickens on cooling without any appearance of free kerosene.

For most plant-lice (aphides) and other soft-bodied insects from 12 to 20 parts of water are added to 1 of the emulsion.

"VISTOLENE."

A contact insecticide, valuable for destroying plant-lice, including black aphid of the peach. Recommended for use in the ratio of 1 to 100.

"MCDOUGALL'S" INSECTICIDE.

This specific, used in the proportion of 1 part to 50 parts of water, has also proved effective in controlling black aphid of the peach.

"BLACK LEAF 40."

A nicotine preparation valuable for summer use in controlling woolly aphis, red mite, &c. It can be used in the proportion of 1 part of "Black Leaf 40" to 300 parts of water. This spray can be used in combination with arsenate of lead.

RESIN-AND-SODA COMPOUND.

A summer mixture for control of woolly aphis.

Proportions: 5 lb. washing-soda, 5 lb. resin, and 40 gallons water.

Preparation: Boil 2 gallons water in a vessel of more than twice that capacity. In this dissolve 5 lb. soda, then add 5 lb. resin, and boil until the resin is dissolved, stirring well. As the mixture very readily foams over, it is necessary to have some cold water at hand to add from time to time to prevent this. Continue to boil until all foaming ceases. Make up to 40 gallons. If used early in the summer this spray is apt to scorch, but it can be safely used from January onward.

FUNGICIDES.

BORDEAUX MIXTURE (WINTER FORMULA).

For apple-scab, pear-scab, and parasitic fungi generally, especially those attacking the peach.

In the case of the peach, if possible spray twice, the first time just after the leaves have fallen, and again just as the buds begin to swell, taking special care to cover the young wood.

Proportions: 8 lb. sulphate of copper, 6 lb. fresh quicklime, and 40 gallons water.

Preparation: Dissolve the sulphate of copper in 20 gallons water; slake the lime slowly and make up to 20 gallons; pour both solutions simultaneously into a third vessel.

In the use of the mixture during the dormant season it should, when tested, show a slight acid reaction.

PURE BLUESTONE.

The use of pure bluestone (sulphate of copper) has become popular in some fruitgrowing countries as a fungicide for winter use. It has so far proved satisfactory in the Dominion, and may supersede the Bordeaux mixture (winter formula), used in the proportion of 1 lb. bluestone to 10 to 15 gallons water.

BORDEAUX MIXTURE (SPRING FORMULA).

Proportions: 6 lb. sulphate of copper, 4 lb. fresh quicklime, 50 gallons water. This formula is specially recommended for the prevention of pear-scab if applied just when the buds are bursting.

Preparation as for winter formula.

BORDEAUX MIXTURE (SUMMER FORMULA).

For apple-scab, pear-scab, &c., and fungoid diseases affecting the tomato.

Proportions: 3 lb. sulphate of copper, 4 lb. fresh quicklime, 40 gallons water.

Preparation as for winter formula.

General Note.—Bluestone is readily soluble when placed in a piece of sacking and allowed to touch the surface of the water, or suspended an inch or two below it, or by using hot water.

The efficiency of Bordeaux mixture depends upon the intimate blending of the two solutions, which is obtained by pouring both solutions simultaneously into a third vessel. It is imperative that the chemicals used be pure, the lime fresh and having a high percentage of calcium oxide. The best results are obtained when the application is made as soon as possible after blending the two solutions. If allowed to stand over eight hours its fungicidal properties largely depreciate.

DUAL-PURPOSE SPRAYS. (INSECTICIDE AND FUNGICIDE.)

LIME-SULPHUR SOLUTION (SPECIFIC GRAVITY 33° BEAUME).

This is beneficial in controlling fungoid diseases, including apple and pear scab (black-spot), leaf-curl, shot-hole fungus, powdery mildew, &c., and is also useful as a summer spray for red mite.

Winter strength: Pip-fruits, 1 part to 10 of water; stone-fruits, 1 part to 15 of water.

Early spring strength: Pears, 1 part to 15 to 20 of water; apples, 1 part to 25 to 30 of water.

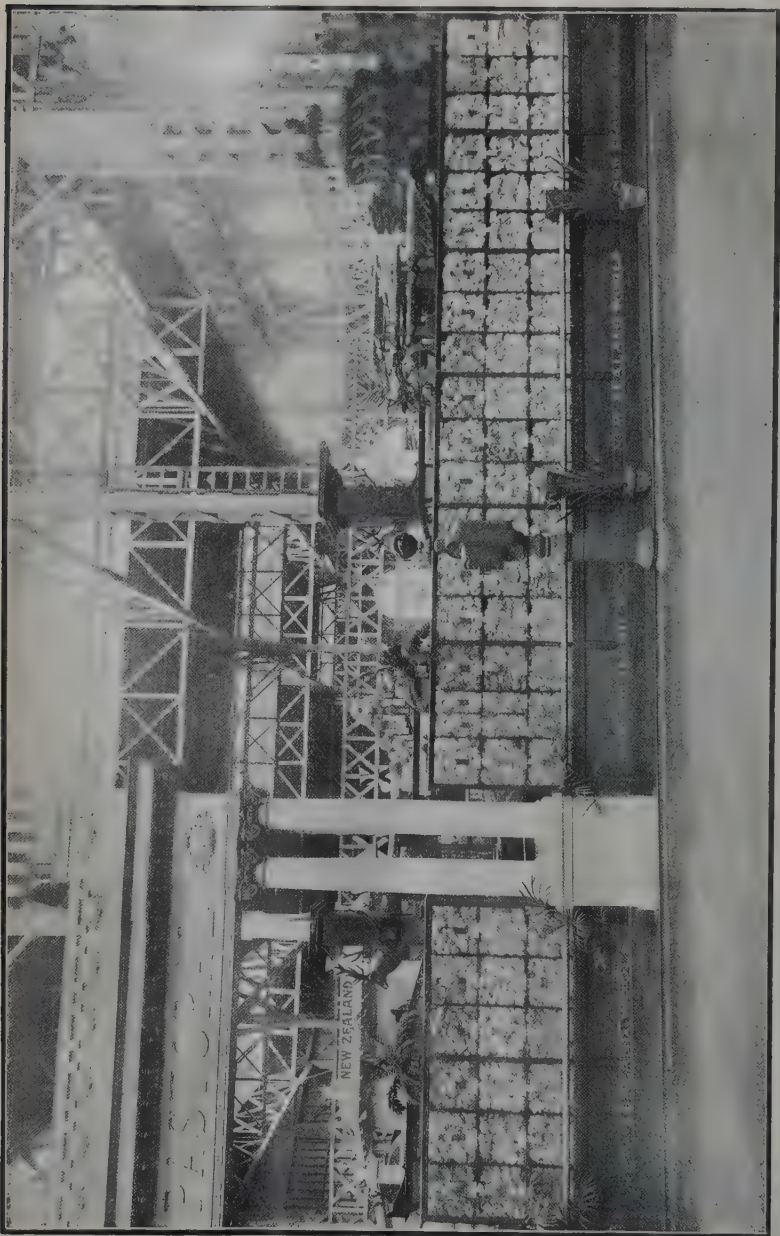
Summer strength: Pip-fruits, 1 part to 80 to 100 of water; stone-fruits, 1 part to 125 of water.

COMBINATION SPRAYS.

When desired the following sprays can be used in combination: Arsenate of lead and Bordeaux mixture; arsenate of lead and lime-sulphur solution; arsenate of lead and "Black leaf 40."

EXAMINATION OF STUD DRAUGHT HORSES.

AN arrangement has been made by the Department whereby stallions and mares entered in the Draught Horse Stud-book published by the Canterbury Agricultural and Pastoral Association can be examined for hereditary unsoundness by Veterinarians of the Live-stock Division, fees being charged therefor. Certain letters will be placed against the names of animals in the stud-book in question, indicating those which have passed the examination. A similar arrangement has been in satisfactory operation for some time in connection with the Clydesdale Society's stud-book.



SOME OF THE WOOL EXHIBITS, NEW ZEALAND COURT, PALACE OF AGRICULTURE, PANAMA PACIFIC EXHIBITION.

WORK FOR THE COMING MONTH.

NEW ZEALAND is a country of wide variation in climatic and soil conditions. In applying suggested procedure it is, therefore, necessary for the farmer to amend it to suit local weather-conditions and the requirements of his soil—information which can best be ascertained by a study of these problems on the part of the farmer himself. Nothing can take the place of local knowledge. Little advice on an agricultural subject is capable of general application in its entirety

THE FARM.

J. DRYSDALE.

SHEARING should now be carried out as soon as possible. Late shearing is not profitable; there is always a danger of sheep getting cast, and in many cases it thus contributes largely to the year's death-rate. Dry sheep intended for sale will also fatten more quickly after the fleece is taken off. Dirty sheep should be dagged before shearing; it is too much to expect the shearer to carry out the two operations at the same time, and, besides, the board gets into in a dirty condition. With a small flock it is not necessary to employ an expert wool-classer; all that is necessary is to put the sheep on the shearing-board free from dags and in a dry and clean condition. Skirting should be done, but not overdone. Remove bellies, take off hairy, stained, or dirty trimmings, and roll up the fleece neatly. Broken or dirty, dingy, and matted fleeces should then be taken out, and fine wool separated from the coarse. Further classing beyond these three divisions is unnecessary for the small farmer.

The dairying season is now in full swing. Milk fever is not so prevalent as it was a few years back. The farmer will have no loss from this trouble if he adopts in time the simple and proper air treatment. Heavy milkers that are likely to become affected should be under observation for twenty-four hours after calving. Instructions have been published so often that it should be needless to say more than that every care should be taken to disinfect the hands, teats, and needle. The cow should be on clean ground and kept on her brisket, propped up with

sacks of hay or chaff, to prevent blowing. This is important, and will require constant attention while the animal is down.

Every attention should be given to the cow's vessel, particularly during the flush of the season. With a careful hand milker the swollen, hard, hot quarter will be noticed at once; with a machine attendant it may escape notice until it is too late. Excitement when in season with the other members of the herd, a chill from a sudden change in the weather, or a change of food may account for trouble in any of the quarters. The vessel should be bathed with warm—not boiling—water, well massaged, and stripped well out, plenty of hot olive-oil being rubbed in afterwards. This should be done three times a day, the attendant's hands and all cloths being afterwards carefully disinfected, as there is always a danger of the presence of germs that may cause serious trouble.

In milking a large number of cows with machines it is a good practice to dip the cups in a bucket of water occasionally during the process of milking. Beware of allowing the machines to get into a dirty condition; the man who will not keep his milker in a thoroughly clean condition should be compelled to go out of the business.

The following process employed at the Weraroa Experimental Farm for washing milking-machines is found to be very satisfactory. Before milking starts 3 gallons of water and one tablespoon of Gold-dust cleanser is prepared. Immediately after milking is finished, and before the machines are removed from the milking-shed, this preparation is drawn slowly through each machine, followed by another 3 gallons of pure water. The apparatus is then taken into the dairy, put into a trough of clean water, and the connecting parts taken off and washed. The trough is then refilled with water and all parts are allowed to remain in water until next milking. Every second day the whole of the parts are taken to pieces, carefully inspected, and thoroughly washed. With this method the parts, inflations included, have always been found in a clean condition.

Weaner pigs are in strong demand, and with the surplus milk on hand the dairyman can put this to a profitable use. There does not appear to be any food (apart from it being the lowest in cost) on which weaner pigs will thrive so well as skim-milk. There are robber cows, and if, similarly, the dairyman should be unfortunate in having to feed robber pigs the result of his labour, no matter what amount of hard work he may put in, will not be profitable. The weedy and bad-skinned pig should be discarded.

Potatoes should be at the stage when all possible attention must be given to scarifying, weeding, and earthing up. Potatoes will respond to liberal treatment. With danger of attack from blight everything should be done to promote a strong vigorous growth, on the principle that prevention is better than cure. If it is decided to carry out spraying, the first application should be made when the haulms are small; the quantity of spray per acre will depend upon the width of rows and size of haulms. If the bluestone-soda spray is used the strength should be 4-4-40 for the first spraying, and increased as the haulms become stronger to 6-8-40.

Turnips and mangels should be sown not later than this month. Ridging is rapidly taking the place of broadcast sowing. With early-sown crops thinning-out and cultivation should receive attention. As some difficulty will be experienced in procuring hand-labour, any implement that will do the work, although not quite equal to the hand, will be welcomed by the farmer. Several fairly satisfactory implements are now on the market, including a three-row scarifier, which can be worked by two light horses.

Varieties of maize for green feeding should be sown. Some of the heaviest-yielding varieties are not procurable this season, but in the absence of these Hickory King, Ninety-day, and White or Yellow Horsetooth can be used. Broadcast sowing is not to be recommended. No doubt with this method, beyond a turn with the harrows when the crop is a few inches high no further labour is necessary, but the resulting crop is much smaller than when the seed is sown in rows of a sufficient width to allow of scarifying occasionally until the crop is well advanced. For direct soiling maize should be fed before coming into flower; for ensilage a later stage would be preferable.

A second sowing of rape should be made. This plant is valuable under favourable weather-conditions for feeding to old ewes and lambs. If $\frac{3}{4}$ bushel per acre of Western Wolths or Italian rye-grass is sown with the rape the feeding-value will be increased very considerably, besides lessening the danger from feeding rape alone. This year Western Wolths is about the same price as Italian rye-grass seed, and for a supplementary or catch crop it has no equal. A bushel of barley or oats is also a good mixture with rape. These will produce quick growth, and can be fed in conjunction with rape, the feeding-value of the crop being increased. Rape should be fed in the young stage before becoming too advanced; the recovery for further feeding will then be more satisfactory.

SOUTH ISLAND NOTES.

W. J. McCULLOCH.

IN the most northern districts of the South Island preparations for the grain-crop harvest should now be taken in hand. Harvesting plant should be carefully overhauled to see that everything is in good working-order. It is most irritating to arrive in the field with the binder or mower and find some part of the machine in disrepair. Much needless worry in stooking can be avoided, and that operation facilitated, by careful attention to the adjustments, while operating the binder so that the band of the sheaf is neither too near the butt nor the head. A firm-standing stook cannot be made from badly tied sheaves. A well-made stook should have a good slant and be firmly butted on the ground, while each pair of sheaves after the first two should be slightly lapping their neighbours in such a way that the whole forms a solid resistance to the wind. In districts where moist weather interferes with stacking the number of sheaves in a stook should never exceed from eight to ten, and the stooks should be placed lengthwise north and south, where possible, to ensure direct sunshine on both sides.

A good and careful stack-builder is well worthy of his hire. Some men build pretty stacks which do not always turn the rain, paying most attention to exterior appearances, while others to some extent neglect outside appearance but build safe and dry. The latter good qualities are much to be preferred, and if combined with neatness are ideal. The main point is to keep the heart of the stack always high, especially from the eaves upwards, so that the butts of the sheaves forming the roof are lower than the heads, thus throwing the rain outwards. Where not intended for threshing immediately, it pays well to thatch as soon after stacking as time permits.

In early districts where the stubbles are available and the season suitable catch-crops may be sown either for ploughing in as green manure or feeding off during winter or early spring. The following would be found suitable, the seedings given being per acre :—

For feeding : (1.) Western Wolths grass, 30 lb. (2.) Italian rye-grass, 30 lb. ; cow-grass, 6 lb. (3.) Cape barley, $1\frac{1}{2}$ to 2 bushels ; tares, 1 bushel. (4.) Emerald ryecorn, 2 bushels ; tares, 1 bushel.

For ploughing under : (1.) Crimson clover, 12 lb. to 15 lb. (2.) Mustard, 10 lb. to 12 lb. |

Root crops should be kept well scarified and free from weeds. Where far enough advanced, mangels, swedes, turnips, or carrots should be thinned. Thinning-machines are undoubtedly a great saving of labour, but never make as efficient work as the hand-hoe. Very fair work and good progress can be made by first putting the thinning-machine over the crop, and then following by hand and singling where necessary what the machine leaves.

Sowing down to grass with rape or turnips may still be continued in southern districts or in damp high altitudes, as may also the main turnip crops.

Haymaking should be commenced during the month. The proper time to mow grass for this purpose is just as the flower comes into bloom. Should the meadow be comprised of a mixture of grasses and clovers the mowing should be put in hand when the majority are coming into bloom. If left standing longer the nutritive value of the hay is reduced, as there is a movement of the sugars and starches in the formation of seed. The exercise of a considerable amount of judgment is required in making good hay, and especially in handling lucerne. The hot, drying winds usually prevalent at this season over a large part of the Island have an injurious effect on hay, scorching it upon the upper part of the swath before the under part is ready for cocking. At such times it should be frequently turned and put into cocks before it is too dry, especially in the case of lucerne, or much of the most nutritive portion will be lost in handling. On no account should hay be stacked while damp, as it will probably heat and lose much of its most valuable qualities. If there is any doubt about the hay being thoroughly dry it is advisable to make a hollow or funnel upwards through the heart of the stack by placing a bag of straw in the centre and raising it up as the stack proceeds. Rye-grass very quickly becomes scorched and bleached if left too long in the sun, and does not make the best of hay unless mixed with a fair proportion of clover. The advice given with reference to keeping the heart full in building a sheaf-stack is equally important in stacking hay.

Careful attention should be given to the periodical spraying of potatoes, as advised last month, and in the earlier districts the tubers will require grubbing and moulding up.

Land required for autumn sowing of wheat should be turned over as opportunity offers, and every advantage taken of favourable weather to shake up with the spring-tooth cultivator any weedy or couchy land undergoing cleaning.

THE ORCHARD.

J. A. CAMPBELL.

IMPORTANCE OF CONDITION IN THE TREE.

FRUIT to develop properly must be well fed. This necessitates a free and abundant supply of sap, and to that end the whole of the tree from root to branch must be kept in a healthy and thrifty condition. To assure this, healthy foliage, good root-system, and freedom from disease are necessary. The leaves of the trees play an important part in the development of fruit, wood, and root extension, and therefore should be protected as far as possible against damage. The foliage of a tree is liable to be affected in any of the following ways: Attacks of eating and sucking insects and fungoid diseases; wind and spray damage; and the lack of an adequate supply of sap from the roots. All these dangers must be guarded against as strictly as possible.

In order to keep the whole system of the tree supplied with sap the roots must be provided with the most favourable conditions. These conditions, apart from the necessary plant-food in the soil, necessitate an adequate supply of moisture. No matter how rich a soil might be, if it lacks moisture it cannot possibly maintain a tree in a healthy state of growth. There are, of course, many stages of soil-dryness to be found during the summer. In extreme cases the effect is clearly evident in the form of small rubbishy fruit and weak drooping foliage, &c. In very bad cases practically the whole of the fruit and the majority of the leaves will fall. In such cases there is no hesitation in attributing this to the lack of moisture, but it is in the more moderate cases of soil-dryness that a good deal of loss is unknowingly experienced.

The lack of moisture invariably affects the development of the fruit, and consequently the pocket of the grower suffers to a serious extent. The tree may look more or less well, but the fruit fails to develop to a satisfactory size, and as a result a much less weight of fruit is gathered. Under such conditions the tree is reverting to its natural state in as far as its habit of fruiting is concerned. In its natural state a tree is concerned with the question only of living and the production of seed with which to propagate and increase its kind, and is not concerned in the production of the highly coloured and otherwise fancy pulp that covers the seed constituting the fruit as we know it. This well-developed fruit has been brought about only after long years of cultivation and scientific treatment, and will continue

to a satisfactory degree only as long as the tree is grown under proper conditions.

Although the hottest weather is usually experienced during the months of January and February, the long hot days of December have the effect of depleting the soil of much of its moisture, and, unless retarded by thorough surface cultivation, this depletion, taking place early in the season, will naturally increase the drought danger during the hotter months to come. Apart from the effect it may have on early fruits, it is a great mistake to be overprodigal with soil-moisture during the months of December, for where the loss is excessive nothing short of a good fall of rain can correct it.

In regard to peaches, particularly the early varieties which set late and mature early, and consequently have only a comparatively short time on the tree, anything approaching a drought in December must very materially affect their development.

The same applies throughout: allow the roots of the tree to be deprived of moisture, the foliage to be damaged in any way, or insects to rob the tree of sap, and to a corresponding extent the fruit crop will suffer.

The remedy is to retain the maximum amount of moisture in the soil by constant and thorough surface cultivation. Prevent the loss of sap and the destruction of foliage by insects and disease by careful attention to spraying; but spray in such a way as to avoid all damage possible. In addition, do not ask the tree to carry more fruit than it is warranted in developing and maturing thoroughly.

The main insect pests and diseases liable to rob the tree of sap and to affect the foliage, for which spraying can now be carried out, are bronze beetle, powdery mildew, woolly aphis, and red mite. Those affecting the fruit are codlin-moth and apple and pear scab (black-spot). For remedies recommended see the revised spraying directions published in this issue of the *Journal*.

TRAINING YOUNG TREES.

Advantage should be taken of the growing season to direct the growth of young trees by removing the surplus and useless growths, thus diverting the flow of sap into those portions of the tree which are required to form the permanent portion. Strong growths, unless the growth is general, will, if left unchecked, result in an unequally balanced tree. In such cases the strong growths should be stopped by nipping off a few inches of the top. The check thus administered will enable the weaker

growths to gain strength, resulting in a more equally balanced tree being formed.

The total removal of wood from young trees should be completed early—that is, by the end of December or early in January—otherwise there is a danger of the tree not recovering from the shock caused by the removal of more or less of its foliage in time to make sufficient growth to compensate for the check before the flow of the sap ceases.

TYING UP.

There are many trees the framework of which is so weak that when laden with fruit the branches bow down to the ground in all directions. Not only does this affect the healthy extension of the leaders, but it renders cultivation next to impossible. The correct method of overcoming or avoiding this condition is to train up a more sturdy tree from the beginning—one with the main limbs sufficiently strong and rigid to bear heavy crops without unduly bowing down. But where weakly framed trees exist—and they are, unfortunately, only too common—the branches should be tied up. This should be done before the weight of the fruit has had any appreciable effect.

There are many means adopted in supporting heavily weighted branches. The old-fashioned crude method of supporting such limbs by use of wooden props is still one of the most common methods employed. There are many objections to this practice. In the first place there is the difficulty and cost of securing and maintaining a sufficient supply of suitable props; secondly, there is the labour entailed in placing and keeping them in position; thirdly, there is the increased difficulty of cultivating among propped trees.

Tying up the heads of the tree with a couple of turns of binder-twine is another method commonly employed, and when properly done this answers far more satisfactorily than propping. One of the most satisfactory means of supporting the larger limbs other than making them self-supporting is to insert a screw with an eye-hole in it into the limb at a height most likely to give the best results. Do the same to a limb on the opposite side of the tree. Stretch a moderately fine wire across, pass the end through the eye of the screw, and make it fast. Tighten up the wire and make the other end fast to the screw in the opposite limb. When the weight comes the wire will tighten up, leaving a neat permanent job. The screws do no perceptible damage to the tree.

THE POULTRY-YARD.

F. C. BROWN.

FATTENING THE COCKERELS.

WHILE December should see all hatching operations over, it is nevertheless one of the busiest months of the year, for at this time the plant will be carrying its greatest number of stock. To lessen the risk of overcrowding no time should be lost in priming off all forward cockerels for the Christmas market. It is poor economy, even when feed is cheap, to keep cockerels after they are four months and a half old. If the cockerel is not marketed at this age it will commence to produce its second feathers, and it may be months before it can be brought to prime condition again. It must also be remembered that the flesh of the prime four to five months old bird is distinctly superior to that of one double the age, and will therefore command a much higher price and a better return over the cost of production than the latter. It is probable that well-fatted cockerels will be worth good money during the approaching festive season, and it will pay to look after the male as well as the female chickens. The cockerels should be separated from the pullets before they commence to crow. It is useless trying to prime them when running with the pullets. When the fattening process begins, at about three and a half months old, exercise must be curtailed. It is not necessary to coop the birds, as they are apt to fret and lose instead of gaining weight. The best plan is to confine them in small runs so that there may be little scope for them to exercise. Only soft food should be given, and fed sparingly for the first two days. Hard grain cannot be digested with the limited amount of exercise. Ground oats, wheat maize, or barley mixed and moistened with milk or soup may be used for feeding purposes. After the first two days feed three times a day all the birds will eat up clean. Green food such as lucerne, clover, cabbage, or lettuce should be fed separately—as much as the birds will pick up without waste. Skim-milk, when this is available, should be given in clean vessels for the birds to drink. Care must be taken that the birds are absolutely free from vermin. Where these are found each bird should be dusted with, say, carbolic powder or sulphur, and the houses must be sprayed with a strong disinfectant. Even under the most careful and effective management the margin of profit from cockerels is small, and if not properly attended to they may easily mean an actual loss of time and money.

GREEN FOOD.

For both growing and adult stock some kind of green food is necessary at the present time if the birds are to be maintained in good health. Green feed not only greatly assists in keeping the birds in a healthy, thriving state, but it saves to a great extent the more costly foods, and thereby lessens the cost of production. The best green foods are lucerne or any of the clover families. These are readily eaten by the birds when chaffed fine with an ordinary hand chaffcutter. Where these are not available, water-cress, cabbage, silver-beet, lettuce, &c., are suitable. It is always best to feed green stuff separately during the middle of the day in such quantities that the birds have all they can eat without waste.

BROODY HENS.

There is much to be lost and nothing to be gained by allowing broody hens to sit on the nest day after day. Not only is there a loss in regard to eggs, but the development of vermin is thereby encouraged. The houses should be visited every evening and all broodies at once removed to a broody-coop. On no account should broody hens be ill-treated—for instance, by compelling them to stand for hours or probably all night up to their hocks in cold water, or by holding their heads under water until they are on the point of drowning. They should be given all the food they will eat, in order that they may lay well when the broody fit is over. The day has gone for considering that the laying-hen is all the better for a rest. If a bird is properly fed and maintained in good condition she needs no rest for the comparatively short laying-life demanded of her in these days of forced egg-production.

COOL BROODING.

That fireless brooders have come to stay is beyond doubt. This system of rearing chickens without any artificial heat has for several seasons past been experimented upon at the Department's Milton Poultry-station, and with most satisfactory results. With the improvements made in these appliances and the better understanding of their working they are fast sounding the death-knell of all systems of brooding where lamps are employed to supply the artificial heat—and this in all climates. The advantages of cool brooding over artificially heated appliances are many. In the first place the original cost as compared with heated brooders is a mere bagatelle; there is no cost for fuel, no time taken up trimming lamps, no risk of fire; a more even temperature is maintained. Moreover, in the hands of a person who has had experience in the

working of cool brooders the labour in attending to the chickens even when first put into the brooder is not much greater than in the case where chickens are being reared under heated systems. In addition, the chicks reared in a fireless brooder are nearest in appearance to the chick reared by the natural mother. During a recent visit to the Department's Milton Station I had the opportunity of comparing chickens being reared with the two systems and under extremely unfavourable weather-conditions. Not only was the thermometer down to a low degree, but a snowstorm was being experienced. The chicks in the heated brooder keenly felt the sudden climatic change. This was indicated by the ruffled condition of the feathers, droopy wings, and a tendency not to leave the heated chamber. On the other hand, the chickens in process of rearing without heat and in an open shed were as hard as nails, being tight-feathered and constantly on the run; in fact, their general appearance pointed in every way to a healthy thriving condition, the cold snap having little or no effect on them. On another plant visited, where previously about twenty individual lamp brooders were employed to do the rearing-work, I found that all the lamps and heating-appliances were done away with, and that the round hovers, as recommended by the Department, were being used in the same boxes. The attendant in charge informed me that his chicks had never done so well before. The appearance of the 1,600 chickens on the plant spoke for itself, being all that could be desired from a health point of view. While there are many different styles of fireless brooders and methods of operating, the particular hover referred to was originated by Mr. A. Carr, late Manager of the Department's Milton Poultry-station, particulars of which were supplied by him in the August issue of the *Journal* in the year 1913.

THINGS TO REMEMBER.

Confined quarters are not desirable for growing chickens.

If fowls are confined and have little exercise and no dust-bath they are apt to learn feather-pulling.

Do not overforce the growing pullets by means of stimulating food. The more naturally they grow the better.

Shelter from wind and shade from the sun are necessary for the good health of birds whether old or young.

Do not keep a distinct weakling or a deformed chicken. As a rule they prove unprofitable to rear.

Crushed oats are always a valuable addition to the growing bird's ration.

Do not forget that late-hatched stock are unprofitable, and that the proper hatching season is past.

THE APIARY.

F. A. JACOBSEN.

SUPERING FOR EXTRACTED HONEY.

DURING the present and subsequent months the work of giving additional room for the storing of the season's crop will claim the attention of beekeepers.

Under average conditions the first super may be put on a colony when the brood-chamber contains eight frames of brood, and it will be found advantageous to lift a couple of the brood-frames to the super, these being replaced by clean empty combs on full sheets of comb-foundation. Delay in supering would materially assist the development of the swarming impulse, which when once started is extremely difficult to check. When a second super is required, which will be when the first one is about half full of honey, it should be placed between the brood-chamber and the first super, thus almost compelling the bees to start on the new addition at once.

QUEEN-EXCLUDERS.

It is not recommended to use queen-excluders at the present time, as these can be used to better advantage later in the season, and an attempt will be made next month to give a plan which the writer considers most practical and desirable.

SWARMING.

A certain proportion of swarming is bound to occur each season no matter what measures are adopted for its prevention. The bee-keeper should therefore have a number of hives prepared to accommodate the swarms. The time occasioned by the preparation of a hive after the issue of a swarm is very often sufficient for their usual short rest before again rising for their second flight, and it is on account of this delay that a large proportion of swarms are lost every year. If the cluster of bees is in a suitable place a sheet may be spread to protect them from the rays of the sun, which are sometimes hot enough to cause a hurried second flight.

Where it is possible to cut off the branch holding the swarm without permanently injuring the tree this plan should be adopted, and the cluster of bees taken to the hive it is intended to occupy; but where this cannot be done other measures, such as shaking or brushing the bees into a box and then transferring them to their permanent location, must be employed.

RETURNING A SWARM TO THE PARENT COLONY.

For reasons unnecessary to explain it is frequently advisable to return swarms to the parent colony, especially after-swarms (those issuing after the first or prime swarm). This is best done by overhauling the parent colony and cutting out all queen-cells, and then shaking the swarm with the bees of the parent colony in front of the old hive. This plan is especially successful if a new brood-chamber of empty combs or sheets of comb-foundation are given in its stead, and a queen-excluder placed above.

FOUL-BROOD. ..

As I have frequently recommended, keep a strict watch for foul-brood at all times, and, when discovered, treat at your earliest convenience as directed in the Department's bulletin. Weak colonies are not worth bothering with, and should be destroyed with fire to prevent further infection. This is the method adopted by most of the successful beekeepers. Apiarists should make sure that their colonies are free from this pest. If doubtful they should forward a sample of suspected comb to the Apiary Instructor for their district, or to the Horticulture Division of the Department, Custom-house, Wellington, for a report.

THE BOX-HIVE NUISANCE.

The Apiaries Act has now been in force for eight years, and although the Apiary Instructors have been paying special attention to sections 5 and 9 there are still a number of box-hive keepers. Where box hives were found it was the custom of these officers to leave a warning notice directing the owners to transfer the bees to properly constructed movable frame hives within a certain period. This practice, however, has not had the desired effect of getting rid of all these disease-breeding boxes. The officers concerned were recently instructed to immediately prosecute all offenders in this direction, and it is anticipated that as a result a great improvement will be effected.

POINTS.

Breed your young queens from the best stock in the apiary.

Keep the long grass clipped away from the hive-entrance.

Keep down a predominance of black drones.

Be sure and provide sufficient ventilation for the needs of the colony.

If there is no water handy to the apiary, supply some in a shady place.

Do not neglect to rear or purchase sufficient young queens to replace the old and failing ones.

THE FARM GARDEN.

W. H. TAYLOR.

ALTHOUGH the hot and dry weather is now setting in, there are many vegetables the sowing of which should be attended to in order to keep up a supply for the immediate future and later in the season.

Peas should be sown twice during the month. It may be again mentioned that with peas, beans, and other like vegetables a smaller sowing at greater intervals will be found to be more advantageous than larger quantities at longer intervals. In regard to peas, they should be staked where possible. In this way the haulms are kept clear of the soil, and the growth is better in every way, the pods being much firmer and cleaner. Cultivation can also be more readily and thoroughly carried out if the rows are staked. When this cannot be done a more dwarf variety should be selected.

French beans, if gathered regularly, will require only one sowing each month. It is wise to see that this is carried out, otherwise the growth will very shortly cease through the formation of seed. Any one wishing to save the seed of any approved kind should set aside a row for that purpose. No green pods should be gathered from such a row, thus allowing the crop to come to maturity. If so treated, seed will be gathered from plants of the fullest vigour.

Red cabbage should be planted as soon as possible, but in favourable situations the operation may be delayed for a little time if required.

Beet.—The red varieties should be planted at once in soil that has been well manured in previous seasons, but not in soil freshly manured with stable manure, as this will tend to make the roots fork and form side shoots. These varieties are the best to plant for the main crop. Turnip-rooted varieties are planted earlier and are mainly adapted for summer use.

Cauliflowers should not be allowed to crowd each other in the seed-beds. *Broccoli* plants are hardier than cauliflowers, but the same precautions are necessary. It is advisable to lift the requisite number of plants and prick them out from 4 in. to 5 in. apart in nursery beds. This has the tendency of breaking the tap-root, resulting in the formation of numerous fibrous roots.

It is inadvisable to sow seed of *Savoy cabbage* early; the better practice is to sow from now onward for a few weeks. The

Savoy is essentially a winter vegetable, and lacks flavour if used before the cold weather sets in. Cabbages and cauliflowers planted during the next few weeks will be found very useful for the latter part of summer or autumn, more particularly where there is a large demand for vegetables. In any case cauliflowers should be planted before Christmas; under such circumstances they will be found useful, as they will come in at a time when there is a scarcity of vegetables and will fill a useful gap.

Brussels sprouts should be progressing equally with cauliflower, and the plants should be treated in the same way.

Onion beds should be kept well cultivated and free from weeds. Unless this condition is maintained they seldom do well. Spraying should also be attended to, particularly if the weather and locality favours attacks of onion-mildew. Spray with the 4-5-50 formula of Bordeaux to control this disease.

Lettuce seed can be further sown, in which case it is advisable to sow in drills where the plants are to remain. They will come to maturity more quickly this way than if transplanted. Sow the seed sparingly, and thin to the required distances.

Parsnips and *Carrots*.—Where the advice given in last month's notes in regard to the main crops has not been carried out it should be attended to immediately, as there is still time. The warm weather and dry state of the soil may result in a bad take if these operations are delayed further. In instances where earlier sowing has been attended to adequate thinning-out and cultivation should not be overlooked if satisfactory results are to be obtained. The same applies to the sowing and attention to the main crops of *cucumbers*, *melons*, and *pumpkins*.

Celery plants where grown under glass should be well advanced. Before planting out they should be allowed to stand out in the open for several weeks, so that they may be thoroughly hardened off. If the seed has been sown in the open the plants should soon be ready for pricking out, but on no account leave them long in a crowded state. Successful celery-growing necessitates keeping the plants growing freely at all stages. Celery should be planted in trenches prepared for the purpose by removing a spit of the upper surface soil and by digging a liberal quantity of manure into the bottom of the trench. The width of the spade is sufficient for a single row. The plants should be put in with a garden trowel on a cool day, if possible, or towards evening. Plant with a good ball of roots and soil, and give the plants a good soaking with water after planting.

SMALL FRUITS.

Gooseberry-bushes.—Further attention should be given to the surplus arising from the centre and unsuitable parts of the bushes. These can be readily disposed of whilst young, and the operation will save crowding, and also lessen the subsequent pruning difficulties.

Red currant shoots should be stopped in the manner previously advised.

Raspberry beds should be well cultivated and all useless suckers kept down.

Strawberry runners required for future planting should be systematically attended to, otherwise good plants cannot be raised. Avoid treading on the runners as much as possible by gathering the fruit from every alternate row; those intervening can be used for layering. One plant only should be raised from each runner, and if such a course will provide the number of plants required it should be adhered to. Stop all runners as soon as a requisite number of plants have been provided for.

Loganberries.—Preserve all the canes produced in the form of suckers. These will fruit next season. They should be protected from injury by loosely tying them together, or if the plants are young the rods may be trained in their proper places, always remembering that the fruit will be produced on laterals arising from the joints of the rods. The rods, therefore, should be trained so as to allow sufficient room for such laterals to properly develop.

A party of agricultural students from the Auckland Technical School spent two days at the Ruakura Farm of Instruction last month.

The Manager of the Moumahaki Experimental Farm reports a keen demand for Ayrshire cattle, especially bulls from good milking-strains. All males from the farm herd ready for sale have been disposed of at satisfactory prices.

At the Canterbury Metropolitan Show this month the Holstein bull championship and first in the any-age class of that breed were awarded to Mr. George Gardner's Dominion Domino Mutual de Kol. This animal was bred by the Department at the Weraroa Experimental Farm, his sire being Oak de Kol and dam Domino's Pride. He was bought by Mr. Gardner as a yearly at last year's Weraroa sale.



EXHIBIT OF OTAGO APPLES AT THE ROYAL HORTICULTURAL SOCIETY'S SHOW, LONDON (SEE PAGE 430).

ANSWERS TO CORRESPONDENTS.

IN every instance a question to which an answer is desired in these columns must be accompanied by the full name and the postal address of the inquirer, not necessarily for publication, but as a guarantee of good faith. The question should be written on one side of the paper only.

THRUSH IN HORSES.

S. H. SMITH, Te Pa, Dannevirke :—

I have a horse that has gone sore on the hind feet for about a month. There seems to be some disease on the sole of the foot, as the frog is rotting away, and there is a very offensive odour when the foot is scraped out. Right in the cleft of the frog there often collects a pasty white substance, and I think it is this that smells so strongly. The horse does not often seem lame, being much worse some days than others. Can you tell me from this what is the matter with him, and what treatment to use?

The Live-stock Division :—

The trouble appears to be what is commonly termed "thrush." This is really an inflammatory condition of the secreting-membrane of the frog. The usual cause is wet and dirt, when animals are standing in filthy stables. In some cases there appears to be a hereditary tendency to it; thus it is more often seen in badly bred cart-horses whose legs are inclined to be greasy. Treatment in the first place consists of removing the cause. Keep the animal under clean, dry conditions. The feet should be attended to and all the loose horn pared off the frog. Poultice the feet for a couple of days to get them clean. Bran in which a couple of handfuls of powdered charcoal has been mixed is as good as anything. Then wash the feet thoroughly, and when dry apply calomel to the parts, working it into the cleft of the frog and dusting it over the other parts. Then pack with tow, and keep it in position by two narrow strips of iron wedged cross-ways between the sole and the shoe. Change the dressing every day, and keep the feet perfectly dry. A few dressings are usually sufficient to arrest the discharge.

CROP QUESTIONS.—CLUB-ROOT.

E. T., Marton :—

I had a paddock stumped, and grew a good crop of swedes on it last season. As it is a long way from a railway, and a threshing and chaffcutting plant cannot get to the paddock, I am unable to follow the swedes with a grain crop. I would like to grow rape and turnips this season. Will you kindly recommend the best seeds and manure; also the best procedure to prevent club-root?

The Fields Division :—

We would suggest that in preference to growing rape and turnips again this year you seed down with a mixture consisting of rape (3 lb.), Italian rye-grass (12 lb.). If you are bent on growing turnips again, the Lincoln Red Globe variety is an early sort that would come in about the same time as rape. It is presumed you require turnips for fattening purposes, and in that case it would be advisable to grow part rape and part turnips, and change your stock from one to the other every few days.

We cannot recommend any procedure at this season to do away with possible affection with club-root; the only preventive of this disease that we are aware of is to apply a heavy dressing of quicklime a year or more before a cruciferous crop is to be grown. The application of lime now would have little effect in preventing club-root in the ensuing crop. Use phosphatic guano or rock phosphate as manure, and avoid superphosphate.

ARSENATE OF LEAD.

V. N., Albertland :—

Would you be good enough to inform me if the spraying of trees with arsenate of lead would in any way poison the grass near-by so as to render it unfit for hay. Would hay that had been sprayed with the poison a few weeks before cutting be safe to feed stock on?

Horticulture Division :—

The spraying of trees with arsenate of lead would not make the grass growing under the trees dangerous to stock. Hay which has been sprayed a few weeks before cutting would be perfectly safe. It may be added that a few years ago the idea got about that fruit sprayed with arsenate of lead was dangerous. We therefore arranged that two of the medical officers attached to the Health Department should visit one of the Government orchards and themselves gather the fruit which had been sprayed with a combined sulphate-of-copper and arsenate-of-lead solution, which as you will readily recognize should, if danger existed, be more serious than plain arsenate of lead. They gathered the fruit and had it tested by the Dominion Analyst. After setting out in detail the analysis, he reported that "the results showed that apples sprayed with arsenate of lead and bluestone in the usual manner during the season contained such minute parts of copper, lead, and arsenic that they may be eaten with perfect safety. In fact, the amount of arsenic is so small that one would require to consume two bushels of apples, skins included, to get a full medical dose of arsenic. Even in the case of apples sprayed immediately before picking, two or three pounds could be eaten, skins and all, without producing serious results, and such apples would be completely freed from arsenate of lead by peeling."

You will see, therefore, that there is no possible risk from fruit which has been sprayed in the usual commercial way a fortnight before gathering, and there would certainly be none from grass under the trees, which would receive less than the trees themselves.

RAPE AND CATTLE.

A. B. C., Wellsford :—

I was much interested in the article on "Beef-production" in the *Journal* for September, but noticed that no mention was made of rape for feed. Would it not be a suitable feed to wean calves into, either grown alone or with other crops? Also, is not rape better than turnips for young growing stock?

The Live-stock Division :—

Neither weaners or young cattle should be fed on rape. If used, it should never be fed alone. Rape is not recommended for cattle.

WESTERN WOLTHS.—LUCERNE IN SOUTHLAND.

H. P., Waipahi, Otago :—

Would you kindly answer the following questions :—

1. When to sow Western Wolths grass; how many pounds of seed to sow per acre; how to save it for seed; how long it should be sown down before leaving it to seed; and whether it should be fed off before leaving it to seed.

2. Can lucerne be grown successfully in Southland?

The Fields Division :—

Western Wolths rye-grass requires a strong soil and a good deal of moisture. It would be preferable to postpone sowing until the end of March or April; 30 lb. is an average seeding. If sown down at this time it may be fed off in late winter and again in spring, but should not be too severely fed on either occasion. It may be closed up for seed about the end of October. If you wish to grow a crop of seed this year you could sow on prepared ground right away, but if the weather sets in dry when the grass is coming away the result would be anything but satisfactory. As it is a surface-rooting and somewhat exhausting crop, you should manure, say, $1\frac{1}{2}$ cwt. of superphosphate and $\frac{1}{2}$ cwt. to 1 cwt. of blood-and-bone manure per acre.

With regard to lucerne, it may be grown successfully in Southland provided the soil-conditions are suitable and cultivation is properly carried out; generally speaking, however, lucerne is a dry-district crop, and, moreover, a crop that is adapted to districts with long summers and short winters. In Southland it would lie dormant for a very considerable portion of the year. It is also essentially a hay-crop, and for that reason is not so well suited to a district with a fairly good rainfall. Our opinion is that a district like Southland, which grows grass, turnips, and oats well, could afford to leave out lucerne. However, there is no reason why you should not satisfy yourself with regard to it by growing a small area in an experimental way. A pamphlet on the subject has been forwarded to you.

DIPPING EWES AND LAMBS.

H. O'CONNELL, Kai Iwi:—

Could you please tell me what would be a suitable mixture for dipping lambs? I have 1,000 lambs on their mothers that are slightly infected with ticks, and which I intend shearing in December next. Also, would it be advisable to dip the ewes at the same time?

The Live-stock Division:—

It would be decidedly a good plan to dip both ewes and lambs off the shears with a good non-poisonous dip, carefully prepared according to the directions; but it will be also necessary to dip them again at the usual time with a good reliable poisonous dip, prepared strictly in accordance with directions. If such a system were carried out by all flockowners with regard to all their sheep there would be far less trouble with tick- or lice-infested sheep.

BLOOD IN MILK.

F. KINNON, Dannevirke:—

I have a cow which calved five weeks ago, and this last two weeks she has milked blood and matter out of one teat (it is no way inflamed), and sometimes blood and milk. She is a healthy cow. Can you tell me the trouble and what to do for her, as she is a valuable beast?

The Live-stock Division:—

The appearance of blood in milk is not uncommon, especially in heavy milkers and first-calvers. It may occur independently of any actual disease, in which case the blood is usually derived from some small vessel which has become ruptured owing to the intense congestion preceding the period of lactation and the subsequent handling during the milking process. Blood may, however, appear in the milk as the result of inflammation of the gland. This condition is generally recognizable by the heat and tenderness of the affected quarter, and the altered appearance of the milk derived from it.

The treatment we would advise you to adopt is to foment the particular quarter and teat with hot water twice daily, followed by very gentle rubbing with camphorated oil. The milk should be withdrawn three or four times a day if the trouble is caused through an inflammatory attack, but if the bleeding arises from congestion and rupture of a vessel it is better only to milk out twice a day. Internally the cow should receive a dose of—Epsom salts, $\frac{1}{2}$ lb.; nitrate of potash, $\frac{1}{2}$ oz.; ginger, $\frac{1}{2}$ oz.; to be dissolved in a quart of thin oatmeal gruel. If you fear that there is something wrong with the milk a sample should be sent to the Officer in Charge, Veterinary Laboratory, Wallaceville, as per directions forwarded to you.

INOCULATING SOIL FOR LUCERNE.

"LUCERNE," Poukawa, Hawke's Bay:—

I am told this is natural clover country, clover appearing the second year after ploughing, and that for this reason it is unnecessary to use inoculated soil for lucerne. Will you please say if I can safely do without inoculated soil? I propose sowing 2 acres of lucerne. I sowed the land in barley in May, and propose ploughing this in shortly and applying 1 ton of carbonate of lime per acre.

The Fields Division :—

The particular bacterium for any legume is specialized for it, and it does not readily, if at all, adapt itself to another species. Considering the cost of laying down lucerne and the trifling expense of applying inoculated soil, it would not be wise to risk partial failure by omitting inoculation.

LIVE-STOCK MATTERS.

A. C. M., Pemberton :—

1. What is best to do for a milch-cow that will not hold to the bull? Since last service I notice a yellowish discharge coming from the cow, and she seems in some pain.

2. At point of a ram's penis there is a string. What function does that serve? It is sometimes cut off by careless shearers: would this render the animal sterile?

The Live-stock Division :—

1. With regard to the cow, there is evidently some disease either of the vagina or womb, but as you do not give any details it is impossible to say what is the cause of the discharge. It may be due to retained afterbirth at her last calving setting up inflammation of the mucous glands of the membrane, or it may be due to another disease called vaginitis, which is contagious. The reason why the cow will not hold to the bull is due either to some structural alteration of the genital organs, such as thickening of the membrane, or more likely to the nature of the discharge. In cows in good health the secretion from the mucous glands is alkaline in character. When the glands become inflamed the secretion becomes acid. This acidity destroys the spermatozoa of the semen of the male, so that conception does not take place. If you will give more details we may be better able to advise you. Open the lips of the vulva of the cow and see if there are any little whitish-yellow points like pin-heads. If there are, it is probably vaginitis, and I should advise you to keep the cow by herself until she recovers.

2. With regard to the ram, there is a peculiar corkscrew-like tube at the end of the penis of the ram. This is technically called the "vermiform appendix," or more commonly the "worm." Its function is supposed to be to assist in guiding the penis during copulation. If it is removed it is generally thought that the animal is rendered useless for breeding purposes. Other people say that this is not correct, and that the ram can get lambs even if it is removed. It is the generally accepted theory, however, that the removal of the part renders the ram sterile. At any rate, shearers should be warned to exercise care when shearing rams, and we should not advise you to use such mutilated animals for general stud purposes.

BLINDNESS IN COW.

"SUBSCRIBER," Otaki Railway :—

A cow after being in milk for three weeks gradually went blind. She did not appear to be in good health from time of calving. She finally got into a deep drain and we destroyed her. Can you give reason for blindness, and could anything have been done for her?

The Live-stock Division :—

As the cow did not appear in good health after calving, it is probable that she had some disease of the womb. This may have been septic metritis, which is due generally to retention of part of the afterbirth, and the absorption into the system of poisons or toxins—in fact, a kind of blood-poisoning. This may have acted on the nervous system and caused the condition of the eyes. It is more likely, however, that the blindness had nothing to do with the calving. What really was the matter with the eyes could only have been determined by a careful examination. In the circumstances we could not say how she should have been treated. One thing, however, you should have done: if you knew the cow was blind you should have put her in a paddock where there were no open ditches or drains for her to fall into.

NEW ZEALAND EXPORTS TO BRITAIN.

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THE JOURNAL OF AGRICULTURE.

NOV. 20, 1915.

COMPILED FROM MANIFESTS OF VESSELS SAILED DURING RESPECTIVE MONTHS OF CURRENT AND PRECEDING SEASONS.

Month.	Mutton, Carcases.	Lamb, Carcases.	Beef, Quarters.	Pork, Carcases.	Butter, Boxes.	Cheese, Crates.	Wool, Bales.	Wheat, Sacks.	Oats, Sacks.	Rabbits, Crates.	Hemp, Bales.	Tow, Bales.	Kauri- gum, Cases.
January, 1915	137,816	296,439	45,622	339	138,081	85,123	87,393	..	..	2,860	683	..	1,209
" 1914	231,766	464,185	30,424	33	150,492	136,086	108,742	..	500	2,851	15,234	4,306	11,133
February, 1915	433,585	517,581	77,421	311	119,371	96,090	159,347	..	..	..	13,111	6,619	2,763
" 1914	354,190	334,207	14,100	3	86,570	59,532	127,372	..	4	..	3,709	633	7,607
March, 1915	80,439	203,480	30,176	..	55,280	51,811	49,809	..	..	..	8,410	185	274
" 1914	446,522	551,313	36,689	..	61,060	62,732	95,175	..	..	..	8,187	2,562	3,958
April, 1915	286,155	328,779	45,340	..	6,703	38,561	41,371	..	..	1,011	9,328	1,474	3,461
" 1914	234,765	366,786	22,185	..	7,822	63,796	58,488	..	2,901	..	1,247	868	5,909
May, 1915	257,953	433,831	34,780	655	148	17,065	21,615	..	..	2,923	4,968	808	2,636
" 1914	336,632	638,397	39,315	54	837	37,776	43,364	3,623	11,062	..	8,355	2,112	9,316
June, 1915	99,080	154,785	19,316	932	..	26,869	11,946	..	..	9,800	5,027	1,320	1,229
" 1914	261,877	634,981	36,400	..	1,153	19,247	18,774	..	28,141	1,000	7,924	4,258	7,881
July, 1915	243,420	340,476	21,231	154	..	21,520	16,039	..	..	5,968	5,068	1,639	4,184
" 1914	235,411	239,143	38,170	..	1,355	2,003	15,868	..	1,425	1,000	5,810	2,584	8,053
August, 1915	510,418	570,381	51,750	35	..	18,287	19,416	..	..	31,790	7,138	1,466	4,848
" 1914	84,251	63,111	19,094	516	1,979	50	4,845	600	38,220	10,403	367	245	3,705
September, 1915	299,715	330,643	59,487	..	26,416	2,595	5,360	..	..	7,750	2,022	3,091	595
" 1914	53,386	49,200	2,353	..	15,885	..	3,337	..	5,896	7,288	1,143	57	..
October, 1915	367,198	417,794	87,104	..	111,468	49,160	7,272	..	..	56,636	5,650	1,645	1,230
" 1914	291,432	128,016	49,104	..	81,842	30,487	8,938	..	68,660	38,121	2,042	1,650	1,683
November, 1914	136,346	27,577	48,302	27	98,729	70,048	37,604	15	24,289	35,783	885	110	1,377
" 1913	20	1,479	..	..	53,468	23,722	1,891	..	..	2,478	4,162	771	2,314
December, 1914	192,952	149,835	44,876	..	172,990	80,144	86,317	..	..	9,506	1,136	116	2,157
" 1913	128,087	86,890	8,909	..	249,526	124,821	51,385	..	250	24,479	19,807	5,276	11,273

STOCK EXPORTED.

THE following table shows the numbers and descriptions of stock exported from the Dominion during the month of October, 1915:—

Port of Shipment.	Horses.			Sheep.			Cattle.			Pigs.		Dogs.	
	To Australia.	To Eastern Pacific.	To Japan.	To Australia.	To Eastern Pacific.	To Montevideo.	To Australia.	To Eastern Pacific.	To Norfolk Island.	To Australia.	To Eastern Pacific.	To Australia.	To Eastern Pacific.
Auckland ..	..	29	..	..	236	..	..	6	..	..	66	..	..
Gisborne ..	..	12	..	..	..	..	..	..	..	..	..	..	..
Napier ..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wellington ..	..	..	..	..	..	..	..	..	..	..	..	..	..
Lyttelton ..	I	..	..	43	..	54	..	..	..	..	..	..	..
Dunedin ..	29	..	..	..	..	..	..	..	..	..	..	..	..
Bluff ..	I	..	..	..	..	..	..	..	..	..	..	..	..
Totals ..	3I	4I	..	43	236	54	..	6	..	..	66	..	..

The following are particulars of horses shipped: Clydesdales, 29 (28 mares, 1 colt); cavalry remounts, 22; 8 hacks (7 mares, 1 gelding); 1 light horse; also 12 mules.

Auckland also exported 9 crates of poultry.

STOCK IN QUARANTINE.

THE following stock was received into quarantine during the month of October, 1915:—

No.	Description.	Sex.	Port of Origin.	Owner or Agent.	Address.
MOTUIHI ISLAND (AUCKLAND).					
1	Terrier ..	Male ..	London ..	E. T. Howell	Auckland.
SOMES ISLAND (WELLINGTON).					
2	Sheep-dogs ..	Male ..	London ..	D. MacDonald	Dannevirke.
QUAIL ISLAND (LYTTELTON).					
7	Southdown rams	Male ..	London ..	J. B. Reid	Oamaru.
1	Collie dog ..	Female	..	J. Lilico	Lochiel.
4	" p ps ..	"	"	"	"
1	" ..	Male ..	"	"	"

HEMP AND TOW GRADING RETURNS.

OCTOBER.

Hemp.—The total number of bales graded was 12,297, as compared with 6,033 for the corresponding month of last year, an increase of 6,264 bales. For the twelve months ending 31st October, 1915, the number of bales graded was 106,100, as compared with 113,710 for the previous twelve months, a decrease of 7,685 bales.

Tow.—During the month 3,167 bales were dealt with, as compared with 1,746 for the corresponding month of last year, an increase of 1,421 bales. For the twelve months ending 31st October, 1915, the number of bales graded was 28,217, as compared with 35,902 for the previous twelve months, a decrease of 7,685 bales.

Stripper-slips.—The number of bales graded was 546, as compared with 108 for the corresponding month of last year, an increase of 438 bales. For the twelve months ending 31st October, 1915, the number of bales graded was 2,761, as compared with 2,807 for the previous twelve months, a decrease of 46 bales.

HEMP, TOW, AND STRIPPER-SLIPS GRADED THROUGHOUT THE DOMINION DURING THE MONTH OF OCTOBER, 1915.

Hemp.

Port.	Superior.	Fine.	Good-fair.	Fair.		Common.	Rejected.	Condemned.	Total.
				High Point.	Low Point.				
	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.
Auckland ..	..	..	142	552	805	74	6	24	1,603
Napier ..	..	..	..	..	..	..	..	..	..
Foxton ..	..	..	1,727	1,705	810	38	37	..	4,317
Wellington ..	..	..	1,208	3,058	619	67	80	..	5,032
Picton ..	..	123	3	..	..	..	..	..	126
Blenheim ..	..	..	332	27	..	..	..	..	359
Lyttelton ..	..	..	..	..	..	..	..	..	..
Dunedin ..	..	..	87	193	30	..	..	..	310
Bluff ..	..	..	141	301	108	..	..	..	550
Totals ..	..	123	3,640	5,836	2,372	179	123	24	12,297
Percentages of totals	..	1'00	29'61	47'46	19'29	1'45	1'00	0'19	..

Tow.

Port.	First Grade.	Second Grade.	Third Grade.	Condemned.	Total.
	Bales.	Bales.	Bales.	Bales.	Bales.
Auckland ..	..	45	470	24	539
Napier ..	..	..	..	..	..
Foxton ..	373	484	126	16	999
Wellington ..	240	641	94	16	991
Picton ..	23	32	..	..	55
Blenheim ..	216	..	..	..	216
Lyttelton ..	..	..	..	..	..
Dunedin ..	..	43	..	24	67
Bluff ..	41	120	134	5	300
Totals ..	893	1,365	824	85	3,167

Stripper-slips.—Foxton: First grade, 71; second grade, 116; condemned, 34—total, 221. Wellington: First grade, 18; second grade, 261—total, 279. Blenheim: First grade, 6; second grade, 23—total 29. Bluff: Second grade, 12; condemned, 5—total, 17.

FORTHCOMING AGRICULTURAL SHOWS.

- Winton A. and P. Association: Summer Show at Winton, 24th November.
- Egmont A. and P. Association: Summer Show at Hawera, 24th and 25th November.
- Otago A. and P. Association: Summer Show at Dunedin, 24th and 25th November.
- Auckland A. and P. Association: Summer Show at Auckland, 26th and 27th November.
- Stratford A. and P. Association: Summer Show at Stratford, 1st and 2nd December.
- Palmerston and Waihemo A. and P. Association: Annual Show at Palmerston South, 3rd December.
- Clutha and Matau A. and P. Association: Show at Ealclutha, 3rd December.
- Tauranga A. and P. Association: Show at Tauranga, 10th December.
- Southland A. and P. Association: Show at Invercargill, 14th and 15th December.
- Maniototo A. and P. Association: Annual Show at Ranfurly, 16th December.
- Tuapeka Agricultural Society: Annual Show at Lawrence, 27th December.
- Waitahuna Farmers' Club: Annual Show at Waitahuna, 28th December.
- Taieri Agricultural Society: Annual Show at Mosgiel, 20th January.
- Woodville A. and P. Association: Annual Show at Woodville, 26th January.
- Helensville A. and P. Association: Annual Show at Helensville, 29th January.
- Feilding Industrial A. and P. Association: Annual Show at Feilding, 1st and 2nd February.
- Golden Bay A. and P. Association: Annual Show at Takaka, 1st February.
- Central A. and P. Association: Annual Show at Waipukurau, 2nd February.
- Dannevirke District A. and P. Association: Show at Dannevirke, 9th and 10th February.
- Rangitikei A. and P. Association: Autumn Show at Taihape, 23rd February.
- Franklin A. and P. Association: Annual Show at Pukekohe, 25th and 26th February.
- Opotiki A. and P. Association: Show at Opotiki, 2nd March.
- Oruru A. and H. Society: Annual Show at Oruru, 3rd March.
- Ashburton A. and P. Association: Annual Show at Ashburton, 15th and 16th March.
- Kaikoura A. and P. Association: Annual Show at Kaikoura, 17th March.
- Temuka and Geraldine A. and P. Society: Show at Temuka, 30th March.
- Oxford A. and P. Association: Annual Show at Oxford, 6th April.